LAKE ONTARIO FISH COMMUNITIES AND FISHERIES:

2008 ANNUAL REPORT OF THE LAKE ONTARIO MANAGEMENT UNIT

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Lake Ontario Fish Communities and Fisheries: 2008 Annual Report of the Lake Ontario Management Unit

Foreword

The Lake Ontario Management Unit (LOMU) is pleased to release its Annual Report of activities during 2008. This Annual Report documents the assessment and management activities that LOMU carried out during 2008. The following introduction provides background and an overview of our programs.

LOMU, one of three Great Lakes units, delivers fisheries and aquatic ecosystem assessment and management programs in support of the Great Lakes Branch's vision and mission of a healthy and sustainable future for the ecosystems of Lake Ontario and the St Lawrence River. LOMU's projects and activities deliver information and management actions to meet the strategic directions and principles of Our Sustainable Future and Ontario's Biodiversity Strategy.

During 2008, LOMU actively pursued the goals and objectives of the Joint Strategic Plan for Management of Great Lakes Fisheries. The Province of Ontario and New York State share responsibility for the fish communities and fisheries of Lake Ontario and the St. Lawrence River. LOMU works in partnership with the New York State Department of Environmental Conservation, within the Lake Ontario Committee, to deliver management support toward shared Fish Community Objectives, and fish community assessment programs intended to evaluate the success of these efforts. These fisheries management and assessment projects are done in concert with Ontario partners (Ontario Ministry of Natural Resources Districts, Ontario Ministry of the Environment, and Conservation Authorities), with Quebec partners, with Canadian federal partners (Department of Fisheries and Oceans Canada, and Environment Canada), with U.S. federal partners (U.S. Geological Survey and U.S. Fish and Wildlife Service), and with international partners (Great Lakes Fishery Commission, Atlantic States Marine Fish Commission).

Ontario and New York work together to deal with challenges to the aquatic ecosystems of Lake Ontario and the St. Lawrence River including: loss of native species, introduction of non-native species, destruction of fish habitat, and spread of fish disease. During 2008, LOMU worked closely with Canadian federal agencies, provincial governments, various U.S. federal and state agencies and non-government partners to develop and implement plans to protect and restore American eel, lake trout, and Atlantic salmon. Similar plans are being drafted for the conservation of lake sturgeon and for the restoration of deep-water coregonids. LOMU worked with partners to understand the spread and initial effects of a new invader, the bloody red shrimp, *Hemimysis anomala*. LOMU provided input to Districts about projects with fish habitat implications. LOMU continued to provide observations to surveys of occurrences of fish diseases and advanced analysis of the effects of disease outbreaks on wild fish.

During 2008, LOMU contributed to the bi-national Lake Ontario Lakewide Management Plan (LaMP) and the Remedial Action Plans (RAPs) identified in the Great Lakes Water Quality Agreement. These efforts were focused on meeting ecosystem objectives for the whole lake and for Areas of Concern (AOC). LOMU participated in the 2008 Lake Ontario Intensive Monitoring Year, working with partners from Canada and the United States to comprehensively sample all aspects of the Lake Ontario ecosystem. LOMU also participated in planning and delivery of the Canada / Ontario Agreement (COA) respecting the Great Lakes Basin ecosystem. These efforts involve direct coordination with Canadian federal and provincial partners and almost all the Conservation Authorities that border Lake Ontario and the St. Lawrence River. These critical efforts to improve ecosystem health and biodiversity are summarized in the individual project reports included in this document.

LOMU staff use a variety of means with which to communicate with the public, stakeholders, partners, the media, and other resource management agencies. Good communications strategies and products are important to effectively convey results of fisheries assessment, management and enforcement programs. LOMU staff routinely

develop communications plans, news releases, public notices, fact sheets, brochures, scientific papers, reports and web products. Staff actively participate on a variety of bi-national and inter-agency committees to share information and expertise, and to develop solutions to problems of common concern in the Great Lakes Basin. Staff interact with the public on a day-to-day basis through phone calls, site visits and contacts made in the field. Consultation helps us to understand stakeholder values, ideas and concerns. During 2008, the effective Lake Ontario Liaison Committee continued its role in providing recommendations about the commercial fishing industry in Lake Ontario and the St. Lawrence River. Also in 2008, a new Fisheries Management Zone 20 Advisory Council was established for the lake and river bringing together a group of volunteers with interests in recreational fishing, commercial fishing, and the environment to assist the Lake Manager with advice and recommendations about recreational fisheries. These liaison committees are the central elements to a strong communications network that helps us make sound resource management decisions (e.g., setting sport fishing regulations, commercial fishing quotas, stocking levels, and fisheries management objectives).

LOMU could not implement its aquatic ecosystem and fisheries assessment and management activities without successful partnerships. LOMU recognizes its many partners and sponsors for their contributions to our program. Each year, partnerships are developed with a variety of non-government organizations and other government agencies to plan and implement a broad range of activities. The details of several notable partnerships are described within the report. We would like to express our sincere appreciation to the partners who contributed to these successful initiatives including: Ontario Power Generation, the Ontario Federation of Anglers and Hunters, Metro East Anglers Association, Credit River Anglers Association, the Liquor Control Board of Ontario, Australia's Banrock Station Wines, the Royal Botanical Gardens, Hamilton Harbor Remedial Action Plan, the Quite Restoration Council, Ontario Commercial Fisheries' Association, the commercial fishers of Lake Ontario and the St. Lawrence River, the Toronto Region, Ganaraska, and Raisin River Conservation Authorities, St. Lawrence Islands National Park, Muskies Canada, Cornell University, the University of Saskatchewan, Trent University, and the University of Toronto.

Our team of skilled and committed staff delivered an exemplary program of field, laboratory, and analytical work that will provide long-term benefits to the citizens of Ontario. During 2008, our staff showed special strength and effort responding to an accident involving our field crew in the open waters of Lake Ontario. The bravery of that field crew and the expertise and effectiveness of the staff who responded to their needs led to a safe and successful conclusion to this incident. We have learned much from the experience and will be applying those lessons in years to come.

With sadness, we note the sudden and tragic loss of our long-time vessel master, Chuck Wood. Chuck was an essential member of the Lake Ontario Management Unit and Glenora for over 20 years. Chuck captained our vessels and their crews safely and effectively over the waters of the lake. We owe much of our success to Chuck and his career.

We are pleased to share the important information about the activities and findings of the Lake Ontario Management Unit from 2008.

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1. Status of Major Species

The following is an overview of the status of major species in Ontario waters of Lake Ontario for 2008. The overview draws largely upon information presented in the chapters and sections that follow in this report. The fish communities of Lake Ontario continue to respond to changes in the ecosystem attributed to the effects of dreissenid mussels.

1.1 Chinook Salmon

Condition of large Chinook salmon in the Credit River in 2008 continued to be lower than most years since 1989, and was similar to 2006 and 2007 (see Section 2.10). Although current prey fish populations still support this top predator, the long term stability of the fish community remains in question.

1.2 Rainbow Trout

Counts of wild rainbow trout at the Ganaraska River fishway have continued to be stable from 1998-2008. Condition of rainbow trout in the Ganaraska River in 2008 remained good; it declined but was only 5% below the long term average (see Section 2.1). Sea lamprey marks on rainbow trout are a concern as they have increased to the highest level observed, including the 1970s before sea lamprey control (see Section 2.1).

1.3 Lake Trout

The abundance of adult lake trout remains low after a period of decline that began in the 1990s, and which is attributed to the combination of decreased survival of the stocked juveniles and reduced stocking numbers. In recent years the early survival appears to be improving again (see Section 2.4).

1.4 Lake Whitefish

Abundance of lake whitefish in assessment gillnets is very low relative to that of the 1990s (see Section 2.4). Many strong year-classes produced in the late-1980s and early 1990s are aging and declining in both assessment gillnets (see Section 2.4) and commercial gear (see Section 4.2). Reproductive success was very low after the mid 1990s until a strong year-class was produced in 2003 (see Section 2.5). Growth of these young fish is very slow (e.g., age-5 fish from 2003 year-class were 22% less in fork length and 58% less in body weight compared to age-5 fish from the early 1990s) and age-at-maturity is delayed by at least two years. In 2008, age-5 fish from the 2003 year-class were the most abundant age-class in the assessment gillnets (22% of the catch). More recent catches of age-0 fish in assessment bottom trawls suggested that poor year-classes were produced in 2004, 2006, 2007 and 2008 but another relatively strong year-class was produced in 2005 (see Section 2.4). The condition of lake whitefish caught in summer assessment gillnets improved after the mid to late 1990s but condition of fish caught during the fall remained low. Commercial lake whitefish harvest increased in 2008 to 68, 072 lb (see Section 4.1).

1.5 Northern Pike

Northern pike, while not abundant in the open-waters of Lake Ontario are common in many embayment and nearshore areas (see Section 2.7). Catches in upper Bay of Quinte assessment gear did not meet the BQFMP target. The plan called for catches to be at least as high as those seen during 2002-2006 but catches have dropped (see Section 7.2).

1.6 American Eel

The total number of eel migrating upstream at the ladders, located at the Moses-Saunders Hydroelectric Dam on the St. Lawrence River, during 2008 was twice what has been observed in recent years (see Section 2.3). While this development is encouraging, the abundance of eel entering the upper St. Lawrence River and Lake Ontario is still less than 3% of the migrations observed in the early 1980s. Even with the closure of the commercial (2004) and sport fisheries (2005), the abundance of yellow eel in the Lake Ontario/upper St. Lawrence River ecosystem remains low (see Section 7.3). The Ontario Ministry of Natural Resources worked with Ontario Power Generation

to stock eels into the upper St. Lawrence River and the Bay of Quinte (see Section 7.1) to help maintain eels in this system and to improve biodiversity. In addition, Ontario is continuing to work with management agencies in other jurisdictions, and other stakeholders, including the Ontario Power Generation, Hydro Quebec, local commercial fish harvesters and the New York Power Authority, to encourage the safe passage of eels around hydro dams and mitigate barriers to migration (see Section 7.3). A pilot project was undertaken to trap large yellow eels in the Lake Ontario – upper St. Lawrence River and release them below all barriers to downstream migration in the St. Lawrence. Preliminary results of this project suggest that some of the transported eel do migrate out of the St. Lawrence River system towards the spawning grounds. It is hoped that these actions will contribute to the fecundity of the global spawning stock. Sustainable management practices throughout the range of this panmictic species in North America will be required to restore eel abundance.

1.7 Smallmouth Bass

Assessment gillnet and nearshore trapnet indices indicate that smallmouth bass, having declined in abundance during the 1990s, remain at low to moderate abundance levels in the nearshore areas of Lake Ontario (see Section 2.4 and Section 2.7). Smallmouth bass catches in Bay of Quinte assessment gear did not meet the target established in the Bay of Quinte Fisheries Management Plan (BQFMP). The plan called for an increase in catches relative to a mean catch threshold established from samples taken during the 2002-2006 sampling period (see Section 7.2). Catches in 2008 did not change from those of the target period.

1.8 Largemouth Bass

Assessment trapnetting and angling survey information indicate that largemouth bass abundance increased in the Bay of Quinte following increases in water transparency and aquatic vegetation in the late 1990s. Their current level of abundance exceeds that of walleye in nearshore areas, and meets the BQFMP target for maintaining catches relative to those seen during 2002-2006 (see Section 7.2). Largemouth bass are moderately abundant in other embayment areas of Lake Ontario (see Section 2.7).

1.9 Panfish

Panfish, particularly pumpkinseed, bluegill and black crappie, increased after re-establishment of submerged aquatic macrophytes in the Bay of Quinte (see Sections 2.4 and 2.5). These events were associated with post-dreissenid mussel invasion in the 1990s. Panfish are also common in other Lake Ontario embayments and nearshore areas (Section 2.7).

1.10 Yellow Perch

Yellow perch is one of the most common species in the nearshore areas (see Sections 2.4 and 2.5). Their current abundance levels in Lake Ontario are low to moderate compared to past levels. Yellow perch catches in 2008 generally exceeded BQFMP targets which call for maintaining catches relative to those seen during 2002-2006 (see Section 7.2). Yellow perch commercial harvest decreased in Lake Ontario and increased in the St. Lawrence River (see Section 4.1). Yellow perch are currently, by far, the most valuable species in the commercial fishery.

1.11 Walleye

While abundance remains considerably lower than during the late 1980s and early 1990s, the eastern Lake Ontario/ Bay of Quinte walleye population has been very stable since 2001 (Section 2.4 and 2.5). For example, assessment gillnet abundance indices for juvenile (age-1 to age 4) and mature walleye indicate that the walleye population has stabilized or increased slightly following their steady decline throughout the 1990s. Further, recruitment indices, based on young of year catch in bottom trawls, indicate that a strong year-class was produced in 2003, and that average (i.e. average for the last ten years) year-classes were produced in 2004, 2005 and 2006. The 2007 year-class index is the 3rd highest since 1995 and the 2008 year-class is the highest since 1994. Catches at age-1 in assessment gillnets suggest that the 2004 year-class is weaker and the 2005 year-class stronger than first indicated by the trawls. The 2003 and 2005 year-classes also figure prominently in nearshore trapnet catches (Section 2.7) including in other areas of Lake Ontario. Based on these recent recruitment levels, the walleye population should

remain stable or increase, at least through the next few years. Current walleye status meets or exceeds BQFMP targets that call for a maintenance of walleye catches at 2002-2006 levels (see Section 7.2).

1.12 Prey Fish

After a record low level in 2007, the abundance of yearling-and-older alewife increased in 2008, but remained in line with the generally low levels observed since 2003. Similarly, there was a modest increase in the population of yearling-and-older rainbow smelt, but the abundance remains low, at levels observed since the early 2000s (see Section 2.6).

Three-spine stickleback abundance decreased dramatically in 2006-2007, prompting concerns for the future abundance of this species. Due to technical difficulties, their status could not be assessed in 2008.

1.13 Round Goby

Round goby invaded Lake Ontario in the late 1990s and first appeared in routine Bay of Quinte assessment bottom trawls in 2001 and gillnets in 2002. Goby distribution expanded to include all areas of eastern Lake Ontario and the Bay of Quinte to depths of at least 36 m by 2006. Overall goby abundance appears to have peaked in the Bay of Quinte and possibly stabilizing Lake Ontario (see Sections 2.4 and 2.5).

2. Index Fishing Projects

2.1 Ganaraska Fishway Rainbow Trout Assessment

The fishway on the Ganaraska River at Port Hope has been in operation since 1974. Prior to 1987 counts of rainbow trout were complete, based on hand lifting and visual counts. Since 1987, fish counts were made with a Pulsar Model 550 conductivity type fish counter. Estimates of missed fish were made through calibration with visual counts. During 2008, rainbow trout were counted and sampled for length, weight and age during the spring spawning run. The count of rainbow trout in the spring run has been relatively stable since 1998, and in 2008 was estimated at 4,713 fish (Table. 2.1.1), about one-third peak abundances observed during the late 1980s (Fig. 2.1.1).

The body condition of rainbow trout in Lake Ontario was calculated as the estimated weight of a 635 mm (25 in) fish at the Ganaraska River. In 2008, the weights of male (2,889 g) and female (3,012 g) rainbow trout were not different than observed during 2007 and were below the long-term average for the data (Table 2.1.2).

In 2008, sea lamprey marks on rainbow trout in the Ganaraska River were the highest observed (Fig. 2.1.2), and were more than five times higher than the average for 1990-2003 (Table 2.1.3). The marking rates from 2004-2008 were similar to levels in the 1970s (Fig. 2.1.2). A high incidence of A1 and B1 marks[1] since 2004 indicated very recent attacks relative to rainbow trout migrating into the Ganaraska River (Table 2.1.4).

[1] King, Everett Louis, Jr. and Thomas A. Edsall. 1979. Illustrated field guide for the classification of sea lamprey attack marks on great lakes lake trout. GLFC Special Publication 79-1.

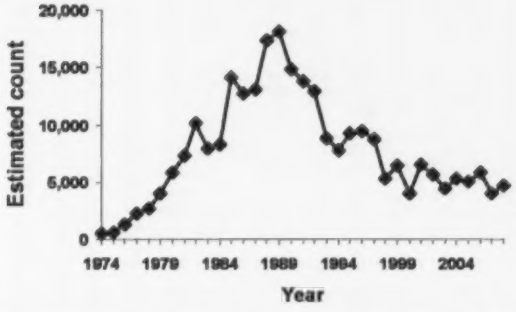

Figure 2.1.1. Estimated upstream counts of rainbow trout at the Ganaraska River fishway at Port Hope, Ontario during April and May, 1974-2008. Estimates for 1980, 1982, 1984, 1986, 1992, and 2002 were interpolated from adjacent years.

Table 2.1.1 Observed and estimated upstream counts of rainbow trout at the Ganaraska River fishway at Port Hope, Ontario during April and May, 1974-2008.

Year	Observed count	Estimated count
1974	527	527
1975	591	591
1976	1,281	1,281
1977	2,237	2,237
1978	2,724	2,724
1979	4,004	4,004
1980		
1981	7,306	7,306
1982		
1983	7,907	7,907
1984		
1985	14,188	14,188
1986		
1987	10,603	13,144
1988	10,983	15,154
1989	13,121	18,169
1990	10,184	14,888
1991	9,366	13,804
1992		
1993	7,233	8,860
1994	6,249	7,749
1995	7,859	9,262
1996	8,084	9,454
1997	7,696	8,768
1998	3,808	5,288
1999	5,706	6,442
2000	3,382	4,050
2001	5,365	6,527
2002		
2003	3,897	4,494
2004	4,452	5,308
2005	4,417	5,055
2006	5,171	5,877
2007	3,641	4,057
2008	3,963	4,713

TABLE 2.1.2 Estimated weight of a 635 mm (25 in) rainbow trout at the Ganaraska River fishway at Port Hope, Ontario during April, 1974-2008.

Year	Male		Female	
	Weight (g)	Sample size	Weight (g)	Sample size
1974	3,069	173	3,214	231
1975	2,971	183	3,070	279
1976	3,171	411	3,326	588
1977	2,978	635	3,166	979
1978	3,183	255	3,341	512
1979	3,221	344	3,337	626
1981	3,176	252	3,360	468
1983	2,879	308	3,032	132
1984			3,178	120
1985	3,171	410	3,205	154
1987	2,643	66	3,046	74
1990	2,868	259	3,071	197
1991	2,851	126	3,087	289
1992	2,998	138	3,113	165
1993	2,952	84	3,135	166
1994	3,247	109	3,357	178
1995	2,960	146	3,077	154
1997	3,143	140	3,269	127
1998	3,035	96	3,195	222
1999	3,063	173	3,226	290
2000	3,120	121	3,241	226
2001	2,919	295	3,040	290
2003	3,034	92	3,151	144
2004	3,054	143	3,184	248
2005	2,985	142	3,109	173
2006	3,024	101	3,137	217
2007	2,922	75	3,006	132
2008	2,889	125	3,012	148
Average	3,019		3,167	

TABLE 2.1.3. Sea lamprey marks on rainbow trout in April 1974-2008, at the Ganaraska River fishway, in Port Hope, Ontario. Since 1990, A1 and A2 marks (King and Edsall 1979) were called wounds and the remainder of marks were called scars to fit with historical classification.

Year	Wounds / fish	Scars / fish	Marks / fish	% with wounds	% with scars	% with marks	N
1974	0.083	0.676	0.759	7.0	33.2	36.8	527
1975	0.095	0.725	0.820	8.0	37.2	40.2	599
1976	0.090	0.355	0.445	6.6	23.3	28.1	1280
1977	0.076	0.178	0.254	6.4	13.5	18.2	2242
1978	0.097	0.380	0.476	8.1	28.4	33.7	2722
1979	0.122	0.312	0.434	10.3	22.8	29.8	3926
1981			0.516			36.2	5489
1983	0.113	0.456	0.569	9.7	33.4	38.8	833
1985	0.040	0.154	0.193	3.7	11.5	14.5	1256
1990	0.015	0.087	0.102	0.0	0.1	0.1	470
1991	0.012	0.091	0.103	1.2	7.4	8.4	419
1992	0.035	0.162	0.197	2.9	14.3	16.5	315
1993	0.034	0.165	0.199	3.1	15.3	17.2	261
1994	0.027	0.156	0.183	0.0	0.1	0.2	301
1995	0.017	0.046	0.063	1.7	4.3	5.9	303
1996	0.023	0.030	0.053	2.3	3.0	5.3	397
1997	0.017	0.158	0.175	1.7	12.7	13.7	291
1998	0.035	0.162	0.197	0.0	0.1	0.2	340
1999	0.015	0.199	0.214	0.0	0.2	0.2	477
2000	0.005	0.272	0.278	0.5	23.2	23.5	371
2001	0.028	0.229	0.257	2.5	17.8	18.8	608
2003	0.017	0.176	0.193	1.7	14.3	15.1	238
2004	0.079	0.464	0.543	6.9	33.7	37.5	392
2005	0.084	0.579	0.664	6.9	39.6	41.4	321
2006	0.088	0.577	0.665	6.9	40.1	44.5	319
2007	0.068	0.665	0.733	5.3	46.6	49.0	206
2008	0.113	0.843	0.956	6.8	66.5	73.3	274

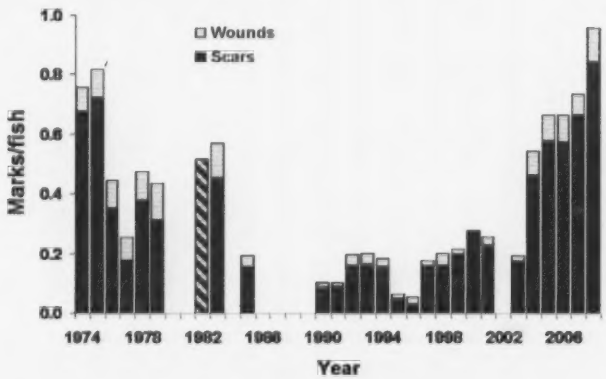

FIG. 2.1.2. Trend in sea lamprey marks on rainbow trout in April, 1974 to 2008, at the Ganaraska River fishway, in Port Hope, Ontario. Since 1990, A1 and A2 marks (King and Edsall 1979) were called wounds and the remainder of marks were called scars to fit with historical classification. Scars and wounds were combined in 1981.

TABLE 2.1.4. Classification of sea lamprey marks (King and Edsall 1979) on rainbow trout in April, 1990-2008, at the Ganaraska River fishway, in Port Hope, Ontario.

	Marks/fish							
Year	A1	A2	A3	A4	B1	B2	B3	B4
1990	0.000	0.015	0.009	0.009	0.000	0.002	0.017	0.051
1991	0.000	0.012	0.012	0.002	0.029	0.010	0.019	0.019
1992	0.013	0.022	0.025	0.019	0.079	0.006	0.010	0.022
1993	0.011	0.023	0.019	0.023	0.061	0.000	0.008	0.054
1994	0.007	0.020	0.010	0.007	0.076	0.010	0.010	0.043
1995	0.007	0.010	0.017	0.003	0.000	0.000	0.020	0.007
1996	0.013	0.010	0.003	0.003	0.005	0.013	0.000	0.008
1997	0.003	0.014	0.021	0.000	0.000	0.021	0.017	0.100
1998	0.012	0.024	0.012	0.041	0.012	0.003	0.015	0.079
1999	0.000	0.013	0.023	0.021	0.010	0.023	0.019	0.105
2000	0.000	0.005	0.027	0.057	0.000	0.003	0.003	0.183
2001	0.002	0.026	0.021	0.069	0.000	0.000	0.002	0.137
2003	0.000	0.013	0.021	0.029	0.000	0.008	0.004	0.118
2004	0.020	0.059	0.084	0.064	0.186	0.005	0.031	0.094
2005	0.016	0.069	0.075	0.072	0.315	0.003	0.040	0.075
2006	0.028	0.060	0.147	0.050	0.150	0.031	0.047	0.150
2007	0.010	0.058	0.087	0.044	0.432	0.000	0.034	0.068
2008	0.022	0.091	0.142	0.018	0.380	0.015	0.161	0.128

2.2 Large Salmonid Predation Impacts on Post-smolt Salmonids

The purpose of this program was to document the predation rates of large salmonids on smaller salmonids, particularly Atlantic salmon shortly after smolting and/or stocking, along the Lake Ontario shoreline during spring. Mortality during the early stages of life in the open-lake is hypothesized to be a critical factor involved in the decline in abundance of rainbow trout and other salmonids in Lake Ontario. Changes in distribution of adult salmon and trout and other prey species may be affecting their interaction and predation on juvenile salmonids. 2008 was the second year of this 3-yr survey.

The fish community was sampled using gillnets, set on the bottom or suspended. Each gillnet catch was standardized to represent the total number of fish in 100 m of each mesh size and summed across the ten panels with mesh sizes from 38-152 mm (1½-6 inch) with 13 mm (½ inch) intervals. In addition, on a subset of gillnets we attached a 13 mm (1 inch) panel that's catch was reported separately. Sampling occurred from May 6-May 23, 2008. Gillnets were set for 1 night at 54 locations (Fig. 2.2.1) in the nearshore depths of central Lake Ontario from Newcastle (78° 35′ longitude) to Collier Shoal (77° 50′ longitude).

FIG. 2.2.1. Map showing gillnet sampling locations in central Lake Ontario, during May 2008.

Gillnets were set randomly, stratified by 3 site depth zones, 2 net depth zones, and on an east-west basis by the longitudinal portion of the 5-minute grid. Site depth zones were: 3-5 m (4), 5-10 m (7.5), and 10-20 m (15). Net depth zones were: bottom and midwater. Within these strata longitude, site depth and midwater depth were chosen randomly. Midwater depth was chosen from 3-meter suspended depth options (2-5, 5-8, 8-11, and 11-14 m) leaving at least 1 m between the net lead line and the lake bottom. A 2-meter gap between the surface and the cork line was left for passage of small boats.

TABLE 2.2.1. The sampling distribution of bottom gillnets in central Lake Ontario, during May 2008.

		Number of samples	
Area	Site depth zone (m)	Standard gillnet (38-152 mm)	Extra 13 mm panel
East	4	3	1
East	7.5	3	0
East	15	3	2
Middle	4	12	3
Middle	7.5	9	1
Middle	15	7	0
West	4	3	0
West	7.5	3	0
West	15	3	0

Sampling effort was weighted by site depth zone and net depth zone. Among the above strata the sampling intensity was increased for higher precision closer to the Ganaraska River and Cobourg Creek, where juvenile salmonid density was expected to be higher. Bottom sampling in the middle of the study area received about 3 times the effort as the areas east and west (Table 2.2.1). Bottom sampling was balanced among depth zones in the east and west areas. In the middle area sampling was intentionally unbalanced to increase precision in the shallower depth zones. The location of gillnets with a 13 mm panel was arbitrary (Table 2.2.1). All suspended nets were set in the middle area, and no suspended depths of 11-14 m were selected, in part due to the lower number of sites with this zone available for random selection (Table 2.2.2). In addition to the normal biological sampling in other LOMU gillnet programs; stomachs were collected to examine diet, including predation of salmonids. That analysis is ongoing and its results will be reported at a later date.

TABLE 2.2.2. The sampling distribution of suspended gillnets in central Lake Ontario, during May 2008.

Area	Site depth zone (m)	Net depth zone (m)	Number of samples
Middle	7.5	3.5	3
Middle	15	3.5	1
Middle	15	6.5	2
Middle	15	9.5	2

TABLE 2.2.3. The average catch per standard gillnet in bottom gillnets in central Lake Ontario, during May 2008.

	Site depth zone (m)/Area								
Species	4 East	4 Middle	4 West	7.5 East	7.5 Middle	7.5 West	15 East	15 Middle	15 West
Alewife	0	59.8	13.2	2.2	9.5	28.5	28.5	8.5	11
Chinook salmon	0	1.1	0	0	0	0	0	0	0
Rainbow trout	2.2	1.1	0	0	0	0	0	0	0
Atlantic salmon	0	1.1	0	0	0	0	0	0	0
Brown trout	4.4	9.3	19.7	2.2	2.2	11	0	0	6.6
Lake trout	4.4	3.8	2.2	4.4	1.5	0	8.8	5.6	0
Round whitefish	0	1.1	0	0	11.7	2.2	0	1.9	2.2
Longnose sucker	0	0	0	0	0.7	0	0	0	0
White sucker	2.2	6	6.6	0	11.7	2.2	0	0	4.4
Lake chub	0	0	0	0	0	0	2.2	0	0
Rock bass	0	0	0	0	0.7	0	0	0	0
Yellow perch	0	0.5	0	0	0	0	0	0	0
Walleye	6.6	1.1	2.2	2.2	0.7	2.2	0	0	0
Round goby	107.5	34	19.7	13.2	40.2	8.8	76.8	93	2.2

Fifteen fish species were observed in the samples, an increase from 11 species in 2008. Significantly, two new species were Atlantic salmon and rainbow trout and these were only observed in the new 4 m depth zone (Table 2.2.3). As well, rainbow smelt were observed only in the 13 mm gillnet panels (Table 2.2.4). Accordingly, the modifications to the program in 2008 proved very instructive. In addition, walleye were observed in 2008 for the first time, and were observed in greater abundance in the shallower depths of the east (Table 2.2.3). The catches in bottom gillnets were dominated by two major prey species: alewife, and round gobies (Table 2.2.3). Suspended nets caught only alewife and round gobies (Table 2.2.5). The catch of round gobies (a benthic species) in a single suspended sample suggests the net had sagged down and touched the bottom.

The fork length of salmon and trout indicated the presence of juveniles (> 275 mm) and larger, potential predators of the juveniles (Figure 2.2.2). However, gillnet selectivity increases with fish size and so the juveniles are likely underrepresented in our samples.

TABLE. 2.2.4. The average catch per 100 m of 13 mm (1 inch) gillnet in central Lake Ontario, during May 2008.

	Site depth zone (m)/Area			
	4	4	7.5	15
Species	East	Middle	Middle	East
Alewife	0	4.4	0	3.3
Rainbow trout	6.6	0	0	0
Rainbow smelt	6.6	0	0	13.2
Lake chub	0	2.2	0	0
Round goby	414.5	568	572.4	384.9

TABLE 2.2.5. The average catch per standard gillnet in suspended gillnets in central Lake Ontario, during May 2008.

	Site depth zone (m)/Net depth zone (m)			
Species	7.5	15	15	15
	3.5	3.5	6.5	9.5
Alewife	8.8	0	3.3	3.3
Round goby	17.5	0	0	0

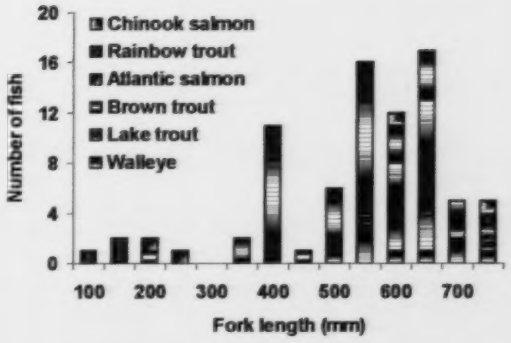

FIG. 2.2.2. Fork length of salmon, trout, and walleye observed in gillnets in central Lake Ontario, during May 2008.

2.3 R.H. Saunders Hydroelectric Dam Eel Ladder Monitoring

The Saunders eel ladder, operated by Ontario Power Generation on the Canadian side of the Moses-Saunders Power Dam, has provided counts of American eels migrating upstream since 1974. A second fishway, the Moses eel ladder, has been operated since 2006 by the New York Power Authority on the US side of the dam. The Saunders eel ladder was opened on Jun 13 and closed on Oct 23, 2008 (132 days). Continuous counts of eel migration activity were obtained by a photoelectric counter at the top of the ladder (Fig. 2.3.1).

It is estimated that a total of 6,398 eels passed the fishway during the entire period of operation after interpolation of counts on days when the counter did not function (14 days) and removing the false positive counts (5% of total). The first counts at the eel ladder were recorded on Jun 21 and the last ones on Oct 23. The peak migration period was Jul 9-Aug 8 (4,883 eels total; 157.5 eels per day; 76.3% of total) with a peak count (322 eels) observed on July 30. Eel activity was recorded at the top of the eel ladder during every hour of the day but the highest activity (90.8% of total) occurred between 7:00 PM and 6:00 AM.

The electronic counts were compared to manual counts, usually once a week, throughout the season. The overall difference of the electronic counter compared to manual counts was 2.1%. The average difference per week of counting was 5.6%.

This year's count at the Saunders ladder is somewhat higher than observed during 2007 (2,689 eels) but similar to that observed during 2006 (8,960 eels). At the 3-yr old Moses eel ladder, a total of 25,932 eels transited the passage facility which was operated

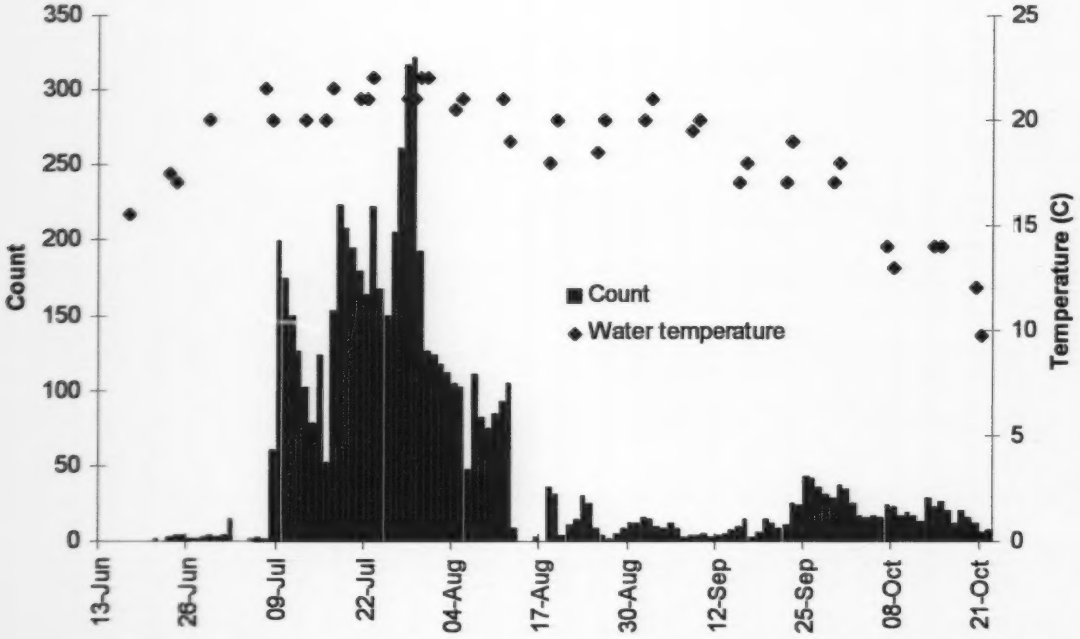

FIG. 2.3.1. The numbers of eel counted daily at the top of the eel ladder located at the R.H. Saunders Hydroelectric Dam during 2008. The water temperature at the bottom of the ladder is also provided.

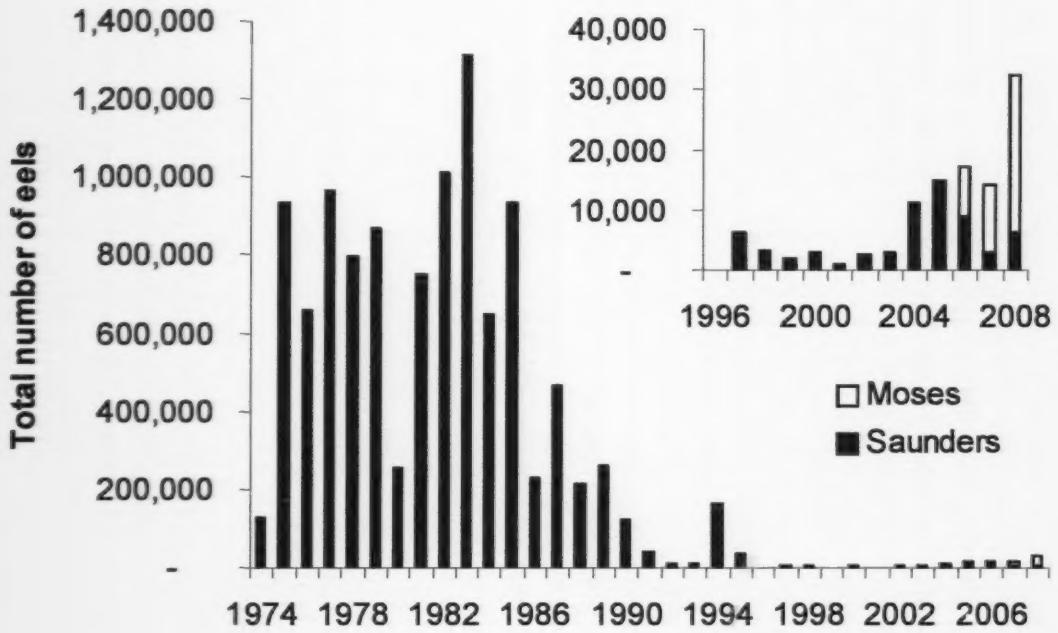

FIG. 2.3.2. Total number of eels ascending the eel ladder(s) at the Moses-Saunders Dam, Cornwall, Ontario for 1974-2008. No counts are available for 1996.

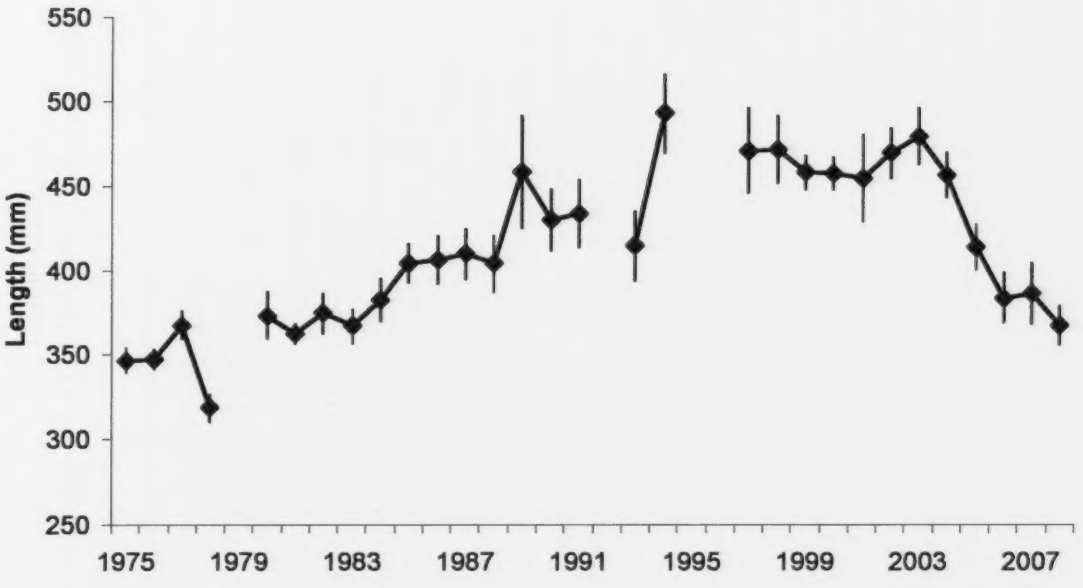

FIG. 2.3.3. Length (error bars are 95% confidence limits) of eel migrating upstream through the eel ladder located at the R.H. Saunders Hydroelectric Dam, 1975-2008.

between July 1 and November 1, 2008. During 2006, the first year of operation for the Moses ladder, the numbers at the two eel ladders were very similar. During both 2007 and 2008, almost 4-times more eels were estimated to transit the Moses ladder at the south end of the dam compared to the Saunders ladder.

Combined, 32,330 eels passed the two ladders during 2008. This number is approximately double what was observed in 2006 (17,144) and 2007 (14,204) and continues the trend of increasing numbers since 2001. However, the numbers migrating upstream are still less than 3% of the numbers of eel observed during the early 1980s (Fig. 2.3.2, over 1-million eels per year during 1982 and 1983).

A sub-sample of 343 eels were collected and sampled for biological characteristics. The average size of eels migrating up the ladder during 2008 (average length 367 mm, range 195-723 mm, Fig. 2.3.3) was smaller than observed during 2007 and continued to show the trend of declining size that started in 2004. Only three times since 1984 (2006, 2007 and 2008) have eels, ascending the ladder, averaged less than 400 mm. PIT tags were identified in 11 of the fish sampled.

[1]Personal communication with Dr. Ron Threader, Ontario Power Generation, PO Box 950, 2 Innovation Drive, Renfrew, Ontario, K7V 4H4. ron.threader@opg.com

[2]Personal communication with Dr. Kevin McGrath, New York Power Authority, 123 Main Street - 15K, White Plains, NY, 10601, United States of America mcgrath.k@nypa.gov

2.4 Eastern Lake Ontario and Bay of Quinte Fish Community Index Gillnetting

Bottom set gillnets have been used at fixed index netting sites (Fig. 2.4.1) in eastern Lake Ontario (ranging in depth from 2.5-140 m) and the Bay of Quinte (ranging in depth from 5-45 m) annually beginning with the Hay Bay site, in the Bay of Quinte, in 1958. Gillnets are multi-paneled with mesh sizes ranging from 1½-6 inch (½ inch increments) stretched mesh. Monofilament mesh replaced multifilament in 1992. The gillnetting program is used to monitor the abundance of a variety of warm, cool and cold-water fish species in the eastern Lake Ontario and Bay of Quinte.

Species-specific catches in the gillnetting program are shown by geographic region in Tables 2.4.1-2.4.8 for 1992-2008. Each gillnet catch was standardized to represent the total number of fish in 100 m of each mesh size and summed across the ten mesh sizes from 1½-6 inches. Thirty different species and over eight thousand individual fish were caught in 2008.

More detailed biological information is presented below for selected species including lake whitefish, walleye, round goby and lake trout.

Lake Ontario

Middle Ground

Seven species were caught at Middle Ground in 2008. The most abundant species were yellow perch, white sucker, northern pike, alewife and walleye (Table 2.4.1). Yellow perch were more abundant in 2008 than in 2007 but less abundant than the average during 1992-2008. White sucker, northern pike and brown trout were more abundant in 2008 than their long-term averages. Walleye were less abundant than their long-term average. Alewife, a species that was moderately abundant in the early to mid-1990s but not been caught in the past five years, reappeared in the 2008 catch at Middle Ground.

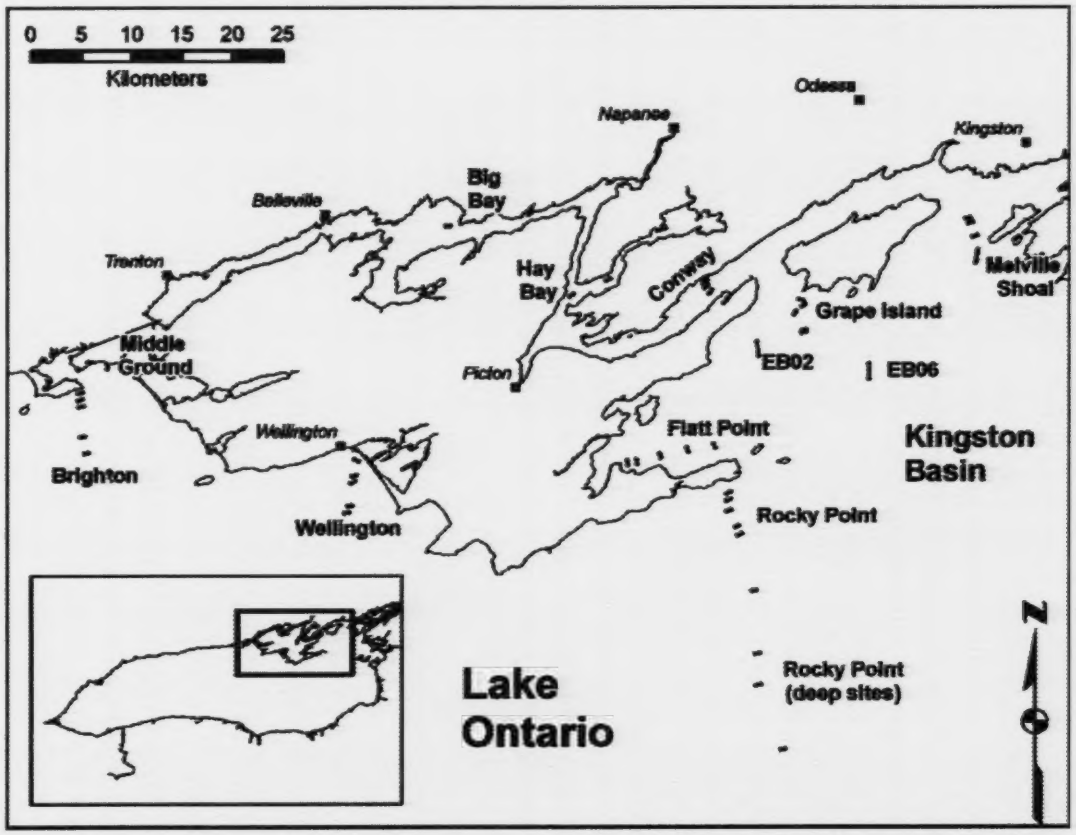

FIG. 2.4.1. Map of northeastern Lake Ontario. Shown are eastern Lake Ontario and Bay of Quinte fish community index gillnetting locations.

Northeast

Seventeen species were caught in the Northeast Lake Ontario gillnets in 2008. The most abundant species were alewife, round goby, yellow perch, rock bass, and brown trout (Table 2.4.2). Of these species, alewife, rock bass and brown trout were more abundant in 2008 than the 1992-2008 average while round goby and yellow perch were less abundant. The cold-water benthic species, lake trout, lake whitefish and round whitefish, declined markedly over the 1992-2008 time-period. Round goby, caught for the first time in 2003 is now, along with yellow perch, the second most abundant species in the northeast region.

Rocky Point (deep sites)

Five species, alewife, lake trout, lake whitefish, rainbow smelt and slimy sculpin were caught at the Rocky Point deep sites in 2008 (Table 2.4.3). Alewife were more abundant in 2008 than in any other year since 1997.

Kingston Basin (nearshore sites)

Fourteen species were caught in Kingston Basin nearshore gillnets in 2008. Similar to 2007, the most abundant species were alewife, yellow perch, walleye, round goby, and rock bass (Table 2.4.4). Alewife and rock bass were more abundant in 2008 than their long term averages; yellow perch, walleye and round goby were less abundant. Round goby declined to its lowest level since being caught for the first time in 2003. Burbot, which were caught each year from 1992-2004, have not been caught in the last four years.

Kingston Basin (deep sites)

Nine species were caught in Kingston Basin deep gillnets in 2008. The most abundant species were alewife, lake trout, lake whitefish, yellow perch and brown trout (Table 2.4.5). The catches of each of these species was higher in 2008 than in 2007. Round goby, caught for the first time in 2004 at these deep sites, were not captured in 2008.

Bay of Quinte

Big Bay

Thirteen species were caught in Big Bay gillnets in 2008. The most abundant species were white perch, yellow perch, walleye, freshwater drum and common white sucker (Table 2.4.6). Of these species, all except freshwater drum were more abundant in 2008 than their 1992-2008 average. Brown bullhead have shown an steady decrease in abundance since 2001. Round goby, first caught here in 2003, have not been caught since 2005.

Hay Bay

Thirteen species were caught in Hay Bay gillnets in 2008. The most abundant species were yellow perch, white perch, white sucker, walleye and northern pike (Table 2.4.7). Of these species, white perch and northern pike were more abundant in 2008 than the 1992-2008 average; while the others were less abundant. Round goby, having been caught each year from 2002-2005, were absent from the 2006-2008 catches.

Conway

Seventeen species were caught in Conway gillnets in 2008. The most abundant species were alewife, yellow perch, rock bass, walleye, and white perch (Table 2.4.7). Of these species alewife and rock bass were more abundant in 2008 than the 1992-2008 average; the other species were less abundant. Round goby, which were caught for the first time in 2002 and which had increased to a high abundance level by 2004, have subsequently declined to very low levels.

Species Highlights

Lake Whitefish

Eighty-six lake whitefish were caught in the 2008 index gillnets up from 51 the year previous and 28 in 2006. Twenty-two percent of these fish were age-5 from the 2003 year-class. These age-5 fish were an average of 369 mm fork length and 592 g in weight (Table 2.4.9 and Fig. 2.4.2). Fifty-six percent of these age-5 fish were classified as mature. Lake whitefish condition appears to have stabilized at a level (e.g. a 480 mm fish is approximately 3 lb) lower than that observed in the early 1990s but significantly higher than that in 1996 and 1997 (Fig. 2.3.3).

Walleye

The age distribution of walleye (Table 2.4.10) showed a broad range of age-classes from age-1 to age-21. Generally speaking, during the summer index gillnetting program young walleye were found in the Bay of Quinte (e.g., age-1 to age-5 fish comprised 87% of the Bay of Quinte walleye catch) while older walleye were present in eastern Lake Ontario (e.g., age-6 and older fish comprised 77% of the catches in the Kingston Basin). Of the young walleye, all ages

were quite common indicating that year-class strength has been relatively strong and consistent in recent years. Older walleye, from many strong year-classes, were also abundant in eastern Lake Ontario. The 2003 year-class appears particularly strong in Lake Ontario. Female walleye begin to mature for the first time during the summer at age-3 to presumably spawn the following spring at age-4.

Round Goby

Only large round goby are susceptible to capture in assessments gillnets. Round goby first appeared in assessment gillnets in the northeast and Bay of Quinte in 2002, Kingston Basin nearshore sites in 2003 (depth range 7.5 to 27.5 m), and in Kingston Basin deep sites (depth about 30 m) in 2004 (Table 2.4.11). No round goby were captured to date at Middle Ground or the Rocky Point deep sites (40-140 m). In the Bay of Quinte, round goby abundance initially increased, peaked in 2004, and then decreased substantially over the next four years. In Lake Ontario, goby abundance increased until 2007 and then declined in 2008.

Lake Trout

The abundance of lake trout remains low (Fig. 2.4.4), although increased catches were seen in the Kingston Basin. The current levels were reached around the year 2002, after a period of decline that began in the early 1990s, and which was attributed to reduced stocking levels combined with a decline in early survival of the stocked fish. Recently there appears to be improvement in the early survival (Fig. 2.4.5) which may lead to future increases in adult abundance.

TABLE 2.4.1. Species-specific catch per gillnet set at **Middle Ground**, 1992-2008. Shown are the average catches in 1-3 gillnet gangs set at a single depth (5 m) during each of 2-3 visits to a single site (Middle Ground). The total number of species caught and gillnets set each year are indicated.

	Year																	
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean
Longnose gar	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.1
Alewife	30.9	5.5	76.1	90.2	0.0	10.9	0.0	0.0	0.0	5.4	5.4	0.0	0.0	0.0	0.0	0.0	5.4	13.5
Gizzard shad	0.0	0.0	0.0	6.6	13.2	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	0.0	1.6	0.0	1.6
Brown trout	0.0	0.0	0.0	0.0	0.0	3.3	0.0	3.3	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	1.6	0.6
Lake trout	21.9	0.0	0.0	3.3	0.0	26.3	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0	3.2
Northern pike	4.4	1.1	1.6	0.0	6.6	3.3	0.0	3.3	0.0	0.0	0.0	3.3	0.0	1.6	1.6	9.9	6.6	2.5
White sucker	3.3	2.2	0.0	13.2	19.7	9.9	3.3	23.0	8.2	9.9	20.2	0.0	13.7	4.9	8.2	26.3	14.8	10.6
Common carp	0.0	1.1	0.0	0.0	6.6	0.0	9.9	6.6	0.0	3.3	0.0	4.9	3.3	0.0	0.0	0.0	0.0	2.1
Brown bullhead	4.4	2.2	1.6	32.9	0.0	0.0	26.3	13.2	3.3	13.2	3.3	14.2	1.6	10.4	5.4	4.9	1.6	8.1
White perch	1.1	2.2	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Rock bass	0.0	3.3	3.3	10.9	3.3	3.3	3.3	32.6	27.2	7.1	1.6	3.3	4.9	3.3	0.0	7.1	0.0	6.7
Pumpkinseed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6
Bluegill	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Smallmouth bass	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0	1.6	0.0	0.3
Largemouth bass	0.0	0.0	0.0	0.0	0.0	0.0	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Yellow perch	539.8	267.5	455.0	332.7	129.4	281.6	506.6	419.9	423.7	285.4	400.7	170.1	448.2	193.0	695.6	192.5	291.8	354.9
Walleye	19.0	23.0	25.7	16.4	50.3	3.3	0.0	6.6	0.0	1.6	3.3	6.6	3.3	4.9	8.2	23.0	4.9	11.8
Freshwater drum	0.0	1.1	0.0	9.9	13.2	0.0	6.6	0.0	3.3	0.0	1.6	0.0	19.7	1.6	0.0	3.3	0.0	3.5
Total catch	626	309	565	516	242	345	559	523	467	326	436	204	496	223	722	270	327	421
Number of species	9	10	7	9	8	9	7	10	6	7	7	7	8	8	7	9	7	18
Number of sets	6	6	4	2	2	2	1	2	4	4	4	4	4	4	4	4	4	

TABLE 2.4.2. Species-specific catch per gillnet set in **Northeastern** Lake Ontario, 1992-2008. Shown are the average catches in 1-3 gillnet gangs set at each of 5 depths (range 7.5-27.5 m) during each of 2-3 visits to each of 3 sites (Brighton, Wellington and Rocky Point). The total number of species caught and gillnets set each year are indicated.

	Year																	
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean
Alewife	218.6	130.8	338.7	439.2	721.6	337.3	867.2	535.5	218.3	385.6	657.0	396.9	474.0	916.2	773.4	307.9	877.1	505.6
Gizzard shad	0.1	5.1	0.8	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Coho salmon	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Chinook salmon	1.5	5.5	8.3	3.3	2.6	0.9	1.3	0.5	0.0	0.4	1.4	4.1	4.8	1.5	1.5	2.3	2.0	2.5
Rainbow trout	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Atlantic salmon	0.0	0.0	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Brown trout	0.5	0.3	3.0	0.2	0.0	0.7	0.4	0.2	0.7	0.3	3.3	1.2	1.9	1.0	1.3	0.7	2.6	1.1
Lake trout	80.7	37.3	69.4	60.9	28.5	29.2	27.3	7.7	22.4	11.8	8.9	3.0	7.5	1.3	3.2	1.1	0.7	23.6
Lake whitefish	5.0	9.5	4.8	7.7	2.9	3.4	0.7	0.0	0.7	0.4	0.1	0.8	0.2	0.1	0.2	0.1	0.5	2.2
Cisco (Lake herring)	1.3	1.3	1.2	1.1	0.0	0.0	0.7	0.2	0.0	0.0	0.0	0.1	0.0	0.2	0.3	0.1	0.5	0.4
Round whitefish	5.9	5.2	2.0	6.8	2.4	0.9	0.4	0.2	0.0	0.0	0.5	0.1	0.1	0.0	0.0	0.0	0.0	1.4
Chub	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rainbow smelt	2.5	0.9	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.3
Northern pike	0.1	0.4	0.7	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.2	0.0	0.4	0.1	0.2
White sucker	1.8	1.1	3.8	1.1	0.2	0.4	0.0	0.2	0.2	0.1	0.2	0.0	0.5	0.3	0.1	0.4	0.0	0.6
Greater redhorse	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Lake chub	1.2	0.8	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.1	0.4	0.2
Common carp	0.4	0.4	0.7	0.0	0.7	0.2	0.2	0.0	0.2	0.0	0.0	0.1	0.2	0.2	0.0	0.0	0.0	0.2
Brown bullhead	0.0	0.1	0.0	0.0	0.0	0.2	0.4	0.2	0.9	1.2	0.7	1.9	0.8	1.1	0.0	0.5	0.5	0.5
Channel catfish	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stonecat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	1.5	0.4	0.1	0.0	0.2	0.1	0.6	0.0	0.2
American eel	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Burbot	0.6	1.4	1.3	2.0	3.3	1.1	0.9	0.0	0.9	0.7	1.3	0.3	0.2	0.7	0.3	0.1	0.1	0.9
White perch	0.1	0.0	0.3	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock bass	1.5	2.2	2.5	3.3	2.4	1.7	9.4	4.1	2.7	1.1	1.9	4.4	2.0	1.6	1.5	2.1	4.9	2.9
Pumpkinseed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Smallmouth bass	6.1	4.0	4.4	2.0	0.2	0.4	1.8	4.8	0.4	1.5	1.4	1.5	1.7	0.9	0.9	1.1	1.2	2.0
Yellow perch	100.4	224.4	97.6	135.7	75.6	76.4	48.3	45.8	63.9	27.8	14.7	40.5	23.3	34.7	24.2	56.9	49.8	67.1
Walleye	4.9	6.7	5.6	2.9	1.8	1.8	3.1	2.4	0.8	0.0	1.1	1.2	3.4	4.4	1.8	3.7	1.6	2.8
Round goby	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	2.5	71.3	63.3	162.1	49.8	20.6
Freshwater drum	1.1	1.9	3.0	0.4	2.6	1.6	0.4	1.5	0.4	0.2	0.2	0.4	1.0	0.1	0.3	0.1	0.4	0.9
Total catch	434	439	548	670	845	456	964	603	313	433	693	458	524	1036	873	540	993	637
Number of species	21	21	20	16	14	16	18	14	14	14	16	19	16	18	16	18	17	31
Number of sets	90	90	40	30	30	30	29	35	36	60	60	60	60	60	60	60	60	

TABLE 2.4.3. Species-specific catch per gillnet set at **Rocky Point** Lake Ontario deep sites (range 60-140 m), 1997-2008. Shown are the average catches in 2-3 gillnet gangs set at each of 4 depths during each of 2 visits to Rocky Point. The total number of species caught and gillnets set each year are indicated.

	Year												
Species	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean
Alewife	28.4	88.0	6.2	0.8	80.6	2.5	60.6	95.1	12.1	Not completed	Not completed	157.3	53.2
Lake trout	34.3	34.5	34.5	29.6	44.8	41.1	27.4	14.3	12.1			9.6	28.2
Lake whitefish	0.0	8.6	4.1	0.4	0.8	0.0	0.5	0.0	0.5			1.6	1.7
Cisco (Lake herring)	0.0	2.1	0.4	0.8	0.0	0.8	0.5	1.4	0.0			0.0	0.6
Rainbow smelt	3.7	3.3	2.9	0.8	0.0	1.2	0.0	0.0	0.0			0.5	1.2
Burbot	1.2	0.4	0.8	0.0	0.0	0.0	0.0	0.3	0.0			0.0	0.3
Slimy sculpin	0.0	1.6	0.0	0.4	0.4	0.0	0.3	0.3	0.0			0.5	0.4
Total catch	68	139	49	33	127	46	89	111	25			176	85.5
Number of species	4	7	6	6	4	4	5	5	3			5	7
Number of sets	15	16	13	16	16	16	24	24	24	0	0	24	

TABLE 2.4.4. Species-specific catch per gillnet set in the **Kingston Basin** Lake Ontario (**nearshore sites**), 1992-2008. Shown are the average catches in 1-3 gillnet gangs set at each of 5 depths (range 7.5-27.5 m) during each of 2-3 visits to each of 3 sites (Flatt Point, Grape Island and Melville Shoal). The total number of species caught and gillnets set each year are indicated.

	Year																	
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean
Lake sturgeon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Alewife	838.4	469.6	186.0	538.4	508.6	351.9	1329.3	552.3	392.3	530.6	130.3	151.0	497.0	1195.1	1700.5	825.8	1734.7	701.9
Gizzard shad	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Chinook salmon	0.3	1.9	0.0	0.9	0.0	0.0	0.7	0.2	0.3	0.0	0.0	0.0	0.8	0.4	0.0	0.4	0.0	0.3
Rainbow trout	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Brown trout	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.2	0.0	0.0	0.1	0.1	0.5	0.0	0.4	0.1
Lake trout	66.5	82.5	97.3	76.0	57.7	24.7	15.7	3.4	3.3	6.3	3.0	3.8	2.5	2.3	1.1	4.0	2.6	26.6
Lake whitefish	20.5	42.6	34.6	27.1	15.1	8.4	15.9	1.4	4.8	10.7	6.8	2.9	6.1	1.4	0.7	3.4	1.9	12.0
Cisco (Lake herring)	6.9	3.7	7.1	2.6	0.7	0.0	0.2	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.0	1.3
Round whitefish	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Coregonus sp.	0.0	0.1	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Rainbow smelt	3.5	0.5	0.5	1.7	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.5	0.4
Northern pike	0.8	0.4	0.3	0.4	0.2	0.0	0.5	0.0	0.1	0.4	0.2	0.1	0.1	0.3	0.1	0.2	0.8	0.3
White sucker	5.6	6.0	0.5	1.8	0.0	0.9	4.8	0.3	1.5	1.1	1.0	1.8	2.2	1.3	0.8	0.5	1.2	1.8
Silver sedhorse	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Greater redhorse	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Moxostoma sp.	0.0	0.1	0.0	0.0	0.0	0.2	0.0	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Common carp	0.0	0.0	0.0	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.1	0.1
Brown bullhead	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.1	0.0	0.1	0.4	0.5	0.1	0.1	0.1	0.0	0.1
Channel catfish	1.0	0.1	0.0	0.2	0.0	1.0	0.5	0.5	0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.2
Stonecat	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.4	0.8	1.4	0.9	0.7	1.1	0.0	0.0	0.0	0.4
Burbot	0.1	0.4	0.2	0.7	0.9	1.6	1.4	0.3	0.1	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.4
Threespine stickleback	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
White perch	1.9	2.8	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.2	0.1	0.0	0.0	0.0	0.4
Rock bass	10.9	11.2	5.4	3.7	0.7	10.6	15.5	15.6	8.1	7.7	2.4	4.6	6.1	4.4	6.3	6.4	9.7	7.6
Pumpkinseed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Smallmouth bass	3.7	3.9	1.3	2.9	0.0	3.2	4.2	4.5	1.1	1.2	1.8	2.0	1.6	0.4	1.6	1.6	2.3	2.2
Yellow perch	319.0	306.6	96.2	60.7	58.2	97.7	147.0	118.4	117.8	46.8	112.5	103.9	298.5	127.5	250.7	164.7	71.1	146.9
Walleye	38.3	33.9	18.3	38.8	6.6	21.1	26.1	34.3	13.8	11.3	8.8	9.4	11.9	10.3	17.2	17.2	12.5	19.4
Round goby	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9	129.9	42.2	56.9	46.0	10.9	17.0
Freshwater drum	1.6	0.6	1.2	1.3	0.0	1.1	1.4	0.8	0.5	0.2	0.0	0.5	0.0	0.0	0.1	0.5	0.1	0.6
Total catch	1319	968	450	757	649	523	1564	734	545	618	268	286	959	1387	2037	1071	1849	940
Number of species	19	21	14	16	10	13	16	18	16	16	12	19	17	16	14	14	14	31
Number of sets	86	88	40	30	29	29	29	41	48	60	60	60	60	60	60	60	60	

TABLE 2.4.5. Species-specific catch per gillnet set in the **Kingston Basin** Lake Ontario (**deep sites**), 1992-2008. Shown are the average catches in 4-8 gillnet gangs set at a single depth (approx. 30 m) during each of 3 visits to each of 2 sites (EB02 and EB06). The total number of species caught and gillnets set each year are indicated.

	Year																	
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean
Sea lamprey	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lake sturgeon	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alewife	298.8	183.7	50.7	122.5	74.5	20.0	491.2	629.4	157.3	110.2	2.7	3.4	37.7	11.9	22.9	31.9	46.6	135.0
Chinook salmon	0.3	0.3	0.3	0.3	0.0	0.0	0.3	0.3	0.4	0.8	0.0	0.1	0.1	0.3	0.0	0.1	0.1	0.2
Rainbow trout	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Atlantic salmon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Brown trout	0.0	0.0	0.0	0.3	0.0	0.3	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.1	0.0	0.3	0.3	0.1
Lake trout	276.6	256.3	207.5	166.7	157.4	78.9	51.3	41.4	22.7	10.4	10.1	11.8	12.1	8.1	13.0	15.5	22.9	80.2
Lake whitefish	51.5	71.3	28.8	37.8	29.1	33.4	24.4	16.4	6.2	2.7	2.7	1.1	8.9	1.0	1.9	1.9	7.4	19.2
Cisco (Lake herring)	1.9	0.5	2.2	0.8	0.9	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.4
Rainbow smelt	12.9	4.4	5.5	4.9	1.4	0.3	2.7	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.4	0.1	0.0	1.9
Common carp	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
American eel	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Burbot	0.0	0.3	0.5	0.3	0.7	1.1	0.8	0.3	1.1	0.8	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.4
Trout-perch	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
White perch	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1
Yellow perch	1.4	0.0	0.0	0.0	0.0	0.5	0.0	0.3	0.5	0.0	0.9	0.3	9.6	1.6	2.3	0.5	2.1	1.2
Walleye	0.0	0.0	0.5	0.3	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.1
Round goby	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.3	1.0	1.1	0.0	0.2
Freshwater drum	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sculpin sp.	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total catch	645	517	296	334	264	136	571	688	188	125	17	17	69	23	42	52	80	239
Number of species	10	8	8	10	6	10	8	6	7	6	6	7	11	8	7	9	8	21
Number of sets	24	24	24	24	24	24	24	24	36	24	24	48	48	48	48	48	48	

TABLE 2.4.6. Species-specific catch per gillnet set at **Big Bay**, Bay of Quinte, 1992-2008. Shown are the average catches in 2-4 gillnet gangs set at a single depth (5 m) during each of 2-4 visits (summer). The total number of species caught and gillnets set each year are indicated.

	Year																	
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean
Lake sturgeon	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.1
Longnose gar	5.5	5.5	1.1	23.0	4.9	7.7	0.0	29.6	4.9	6.6	6.6	1.1	6.6	9.9	19.7	2.2	16.4	9.1
Alewife	1.1	1.1	0.0	0.0	4.9	27.4	5.5	0.0	1.6	0.0	5.8	11.0	20.8	0.0	4.9	0.0	6.6	5.6
Gizzard shad	4.4	108.6	30.7	162.8	3.3	1.1	5.5	108.6	3.3	14.0	43.6	13.2	1.1	277.4	1.6	6.6	24.1	50.3
Northern pike	8.8	7.7	7.7	0.0	3.3	1.1	2.2	4.4	4.9	0.8	0.8	0.0	1.1	1.1	3.3	1.1	0.0	2.5
Mooneye	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
White sucker	63.6	53.7	54.8	59.2	47.7	55.9	49.3	23.0	24.7	23.0	60.9	15.4	35.1	16.4	32.9	16.4	28.5	37.3
Moxostoma sp.	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.8	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.3
Common carp	3.3	1.1	6.6	0.0	0.0	4.4	2.2	0.0	0.0	0.0	0.0	1.1	1.1	0.0	0.0	0.0	0.0	1.0
Brown bullhead	36.2	100.0	57.0	21.4	19.7	31.8	38.4	50.4	42.8	44.4	36.2	12.1	15.4	5.5	13.2	5.5	4.4	31.1
Channel catfish	3.3	3.3	5.5	1.6	1.6	2.2	3.3	1.1	0.0	0.0	0.8	0.0	1.1	0.0	1.6	0.0	0.0	1.4
Burbot	0.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
White perch	1235.7	758.5	1537.3	360.2	225.3	277.4	315.5	323.5	302.6	144.7	239.3	393.6	858.6	523.0	1294.4	782.9	838.8	573.5
White bass	3.3	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	1.1	1.1	0.3
Rock bass	0.0	1.1	0.0	0.0	3.3	7.7	0.0	0.0	3.3	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	1.0
Pumpkinseed	0.0	6.6	0.0	1.6	13.2	14.3	82.2	35.1	82.2	111.8	54.3	5.5	28.5	2.2	21.4	3.3	6.6	29.3
Bluegill	0.0	0.0	0.0	0.0	1.6	4.4	11.0	5.5	11.5	46.9	24.7	3.3	2.2	16.4	42.8	35.1	20.8	14.1
Smallmouth bass	0.0	2.2	0.0	0.0	8.2	35.1	12.1	3.3	4.9	3.3	0.0	0.0	0.0	0.0	3.3	0.0	0.0	4.5
Largemouth bass	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0	0.2
Black crappie	2.2	1.1	0.0	0.0	0.0	0.0	3.3	0.0	0.0	1.6	2.5	2.2	1.1	1.1	14.8	6.6	2.2	2.3
Yellow perch	118.4	380.0	62.5	350.3	1129.9	1641.4	2273.2	1209.4	1044.4	1254.1	1203.1	758.8	721.5	677.6	782.9	108.6	414.5	875.8
Walleye	237.9	142.1	122.8	115.1	111.8	81.1	83.3	55.9	49.3	29.6	50.2	42.8	52.6	38.4	70.7	35.1	60.3	71.3
Round goby	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	2.2	3.3	0.0	0.0	0.0	0.5
Freshwater drum	85.5	30.7	85.5	75.7	139.8	179.8	150.2	80.0	90.5	139.8	48.5	48.2	48.2	62.5	129.9	74.6	42.8	89.2
Total catch	1809	1605	1971	1173	1719	2377	3037	1931	1671	1822	1778	1311	1797	1636	2439	1079		1801
Number of species	14	17	11	11	15	18	16	14	14	14	15	15	16	14	16	13	13	24
Number of sets	6	6	6	4	4	4	4	4	4	8	8	6	6	6	4	6	6	

TABLE 2.4.7. Species-specific catch per gillnet set at **Hay Bay**, Bay of Quinte, 1992-2008. Shown are the average catches in 1-3 gillnet gangs set at each of 2 depths (7.5 and 12.5 m) during each of 1-2 visits (summer). The total number of species caught and gillnets set each year are indicated.

	Year																	
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean
Sea lamprey	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0
Lake sturgeon	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Longnose gar	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0
Alewife	119.5	46.1	52.1	117.6	31.3	35.1	29.1	34.0	28.8	126.6	53.5	0.0	8.2	1.6	49.3	24.7	0.8	44.6
Gizzard shad	2.2	21.9	0.5	0.8	0.0	3.3	0.5	4.4	8.2	0.0	1.6	0.0	0.0	0.0	3.3	0.8	0.8	2.9
Chinook salmon	0.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Brown trout	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lake trout	3.8	0.0	0.5	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.5
Lake whitefish	2.2	0.0	0.0	0.0	0.0	0.5	1.1	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Cisco (Lake herring)	1.6	13.2	3.3	5.8	37.8	72.9	62.0	15.4	12.3	6.6	0.8	0.0	0.8	0.0	0.0	0.8	0.0	13.7
Coregonus sp.	0.0	0.0	0.0	0.8	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.2
Rainbow smelt	2.2	0.0	4.9	2.5	0.0	1.1	0.5	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.8	0.0	0.0	0.8
Northern pike	3.8	8.8	15.9	5.8	7.4	2.7	4.4	6.6	4.1	5.8	0.8	2.5	0.0	3.3	2.5	7.4	6.6	5.2
White sucker	46.6	26.3	40.6	55.9	45.2	49.9	36.7	42.8	18.1	37.0	18.9	14.8	40.3	9.9	11.5	9.0	16.4	30.6
River redhorse	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0
Common carp	1.6	11.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8
Spottail shiner	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.1
Brown bullhead	1.1	21.9	4.9	10.7	0.0	0.5	7.1	3.8	5.8	5.8	0.8	1.6	1.6	2.5	5.8	2.5	3.3	4.7
Channel catfish	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.8	0.8	0.0	0.0	0.0	0.0	0.1
Burbot	0.0	0.0	0.0	0.8	0.0	0.5	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
White perch	25.8	182.0	48.8	182.6	27.1	27.4	17.5	120.1	19.7	3.3	35.4	55.1	95.4	0.8	198.2	106.9	136.5	75.4
Rock bass	0.5	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.2
Pumpkinseed	0.0	0.0	0.0	0.8	0.0	1.1	12.6	34.5	1.6	7.4	6.6	4.1	14.0	2.5	4.1	4.9	4.9	5.8
Smallmouth bass	0.0	4.4	0.0	0.0	0.0	0.0	0.5	1.1	0.0	0.8	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Yellow perch	1247.3	1000.0	808.8	1246.7	596.2	944.6	1036.7	1396.4	847.0	948.2	737.7	727.0	565.8	939.1	421.1	671.1	650.5	869.7
Walleye	15.9	103.1	7.7	26.3	18.9	20.3	25.8	32.3	9.9	16.4	24.7	18.1	14.0	5.8	11.5	16.4	7.4	22.0
Round goby	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	1.6	1.6	0.8	0.0	0.0	0.0	0.3
Freshwater drum	1.6	21.9	0.5	8.2	4.1	4.4	5.5	7.7	9.9	1.6	20.6	8.2	43.6	16.4	54.3	6.6	5.8	13.0
Total catch	1476	1463	989	1666	771	1166	1241	1700	967	1160	905	836	786	983	762	853	835	1092
Number of species	16	13	13	15	9	15	16	13	13	12	14	11	11	10	11	13	13	27
Number of sets	12	2	12	8	8	8	8	8	8	8	8	8	8	8	8	8	8	

TABLE 2.4.8. Species-specific catch per gillnet set at **Conway**, Bay of Quinte, 1993-2008. Shown are the average catches in 1-2 gillnet gangs set at each of 5 depths (range 5-40 m) during each of 2 visits (summer). The total number of species caught and gillnets set each year are indicated.

	Year																	
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean
Sea lamprey		0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lake sturgeon		0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Longnose gar		0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alewife		422.8	659.7	370.6	132.8	268.2	353.5	176.1	76.0	54.3	19.1	39.5	106.6	456.9	76.0	127.3	467.1	237.9
Gizzard shad		0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	1.3	0.7	0.2
Chinook salmon		1.1	0.0	0.0	0.0	0.0	0.4	0.2	0.0	0.3	0.0	0.3	0.7	0.0	0.0	0.7	0.7	0.3
Rainbow trout		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0
Atlantic salmon		0.0	0.4	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Brown trout		8.2	2.6	3.3	0.0	0.9	0.2	0.2	0.0	0.7	0.3	2.3	0.7	1.6	1.6	1.0	3.0	1.7
Lake trout		15.4	13.9	8.2	25.5	20.7	9.6	4.6	8.6	4.9	15.1	11.5	13.5	18.1	7.6	8.9	6.3	12.0
Lake whitefish		11.5	5.1	0.0	10.7	4.8	11.8	4.4	2.0	3.0	1.6	4.9	0.7	3.9	2.0	1.6	1.3	4.3
Cisco (Lake herring)		4.9	0.7	0.0	0.0	0.2	1.1	0.7	2.3	1.3	0.0	0.0	0.0	0.0	0.3	0.0	0.7	0.8
Coregonus sp.		0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0
Rainbow smelt		1.1	0.0	0.0	0.0	0.4	1.5	1.1	0.0	1.3	0.0	0.0	0.3	1.3	0.3	0.0	2.3	0.6
Northern pike		1.1	0.4	0.0	0.0	0.4	0.0	0.0	0.0	0.3	0.0	0.3	0.0	0.0	0.0	0.3	0.3	0.2
White sucker		19.2	16.4	14.0	11.1	8.1	9.6	22.6	23.0	21.7	17.1	14.1	6.9	3.9	3.0	9.5	3.6	12.8
Silver sedhorse		0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Moxostoma sp.		0.5	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Common carp		1.1	0.4	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.1
Brown bullhead		1.6	0.7	0.0	0.0	0.2	0.0	0.0	0.0	0.3	0.0	0.7	1.3	1.0	5.9	2.3	0.0	0.9
Channel catfish		0.0	0.4	0.0	0.0	0.4	0.0	0.0	0.3	0.3	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.1
Stonecat		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Burbot		0.0	0.0	0.0	0.0	0.2	0.7	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Trout-perch		0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
White perch		70.3	6.9	19.7	0.4	1.1	0.0	3.9	0.3	0.0	0.3	5.6	17.4	0.0	5.6	8.2	7.6	9.2
Rock bass		43.3	8.8	16.4	5.8	8.3	12.1	13.6	7.2	3.0	5.9	1.0	1.0	3.3	6.3	25.3	13.5	10.9
Pumpkinseed		0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.3	0.3	0.3	0.0	0.0	0.0	0.3	0.0	0.2
Smallmouth bass		4.4	1.1	1.6	1.6	1.3	1.1	3.7	1.6	0.3	0.0	0.0	0.0	0.3	1.0	1.0	0.3	1.2
Yellow perch		1219.2	466.0	546.1	377.5	264.3	311.6	593.2	656.3	430.9	509.9	320.1	218.1	184.2	376.6	119.7	171.7	422.8
Walleye		133.9	62.9	94.0	67.8	19.1	15.4	14.5	25.3	6.6	9.5	17.8	6.9	8.2	12.5	16.4	10.5	32.6
Round goby		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.6	72.4	204.3	5.3	1.0	0.7	1.6	18.2
Freshwater drum		9.9	2.9	3.8	1.2	4.8	1.3	1.1	3.3	0.3	0.7	1.0	4.3	3.3	7.9	8.9	4.9	3.7
Total catch		1970	1249	1078	634	604	731	841	808	531	587	492	583	692	508	334	696	771
Number of species		19	17	11	10	20	17	17	13	19	14	15	16	15	15	18	17	32
Number of sets	0	12	18	12	16	30	30	30	20	20	20	20	20	20	20	20	21	

TABLE 2.4.9. Age distribution of 86 lake whitefish sampled from summer index gillnets, by region, 2008. Also shown are mean fork length, mean weight, mean GSI (females), and percent mature (females). GSI = gonadal somatic index calculated for females only as log10(gonad weight + 1)/log10(weight). A GSI greater than approximately 0.25 indicates a mature female.

	Age (years) / Year class																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total
	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990	1989	1988	1987	1986	1985	
Bay of Quinte	0	0	0	0	1	1	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	4
Kingston Basin (deep)	0	1	0	2	12	15	4	5	1	0	0	0	1	2	2	3	4	1	0	0	0	0	1	54
Kingston Basin (nearshore)	0	2	1	1	5	1	1	0	1	0	0	0	0	1	2	0	0	1	0	0	0	1	0	17
Northeast	0	6	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11
Total	0	9	3	5	19	17	5	5	2	0	2	0	1	3	4	3	4	2	0	0	0	1	1	86
Mean fork length (mm)		232	301	292	369	402	430	446	462		471		477	530	501	521	525	495.5				560	547	
Mean weight (g)		132	294	295	592	769	900	1086	1235		1303		1450	1817	1709	1636	1760	1465				2091	2027	
GSI (females)		0.03	0.07	0.10	0.34	0.51	0.42	0.58	0.47		0.57			0.57	0.62	0.63	0.60					0.54	0.61	
% Mature (females)		0%	0%	0%	56%	80%	100%	100%	100%		100%			100%	100%	100%	100%					100%	100%	

TABLE 2.4.10. Age distribution of 224 walleye sampled from summer index gillnets, by region, 2008. Also shown are mean fork length, mean weight, mean GSI (females), and percent mature (females). GSI = gonadal somatic index calculated for females only as log10(gonad weight + 1)/log10(weight).

	Age (years) / year-class																						
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990	1989	1988	1987
Bay of Quinte	1	12	29	23	8	9	2	3	0	1	0	1	0	1	1	0	0	1	0	1	0	0
Kingston Basin (nearshore)	0	0	0	2	1	23	0	11	4	14	4	8	5	8	9	2	6	4	3	5	3	0
Kingston Basin (deep)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Northeast	0	0	0	0	0	5	0	1	0	0	0	2	0	0	1	1	0	2	2	0	0	1
Middle Ground	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1	13	30	25	10	37	2	16	4	15	4	11	5	9	11	3	6	7	5	6	3	1
Mean fork length (mm)	171	222	331	417	457	509	582	555	584	582	613	644	633	619	619	656	639	672	676	644	625	651
Mean weight (g)	51	114	380	874	1165	1724	2279	2325	2720	2728	3063	3572	3426	3240	3354	3591	3498	3966	3987	3137	3073	3863
GSI (females)		0.06	0.12	0.25	0.28	0.33	0.39	0.40	0.43	0.43	0.44	0.46	0.43	0.42	0.46	0.45	0.49	0.47	0.56	0.34	0.26	
% mature (females)		0	0%	56%	80%	93%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	

TABLE 2.4.11. Round goby catch-per-gillnet, by region, in eastern Lake Ontario and the Bay of Quinte, 1992-2008.

	Region									
	Middle Ground	Northeast	Rocky Point (deep sites)	Kingston Basin (nearshore sites)	Kingston Basin (deep sites)	Big Bay	Hay Bay	Conway	Lake Ontario	Bay of Quinte
1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00
1993	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1994	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1995	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1996	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1997	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1999	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2002	0.00	0.00	0.00	0.00	0.00	0.00	1.64	6.58	0.00	2.74
2003	0.00	1.09	0.00	2.90	0.00	2.19	1.64	72.37	0.80	25.40
2004	0.00	2.54	0.00	129.90	0.41	2.19	1.64	204.28	26.57	69.37
2005	0.00	71.31	0.00	42.25	0.27	3.29	0.82	5.26	22.77	3.13
2006	0.00	63.26	n/a	56.89	0.96	0.00	0.00	0.99	30.28	0.33
2007	0.00	162.09	n/a	46.02	1.14	0.00	0.00	0.66	52.31	0.22
2008	0.00	49.79	0.00	10.91	0.00	0.00	0.00	1.64	12.14	0.55

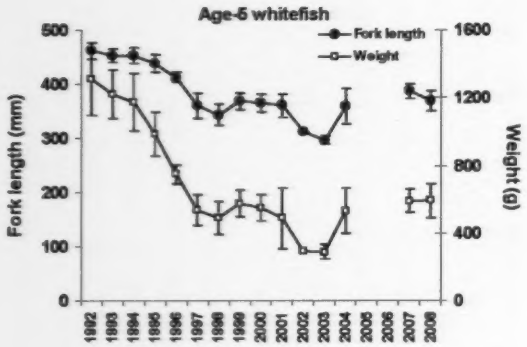

FIG. 2.4.2. Lake whitefish fork length and weight of an age-5 fish caught in summer index gillnets, 1992-2008. No age-5 fish were caught in 2005 or 2006.

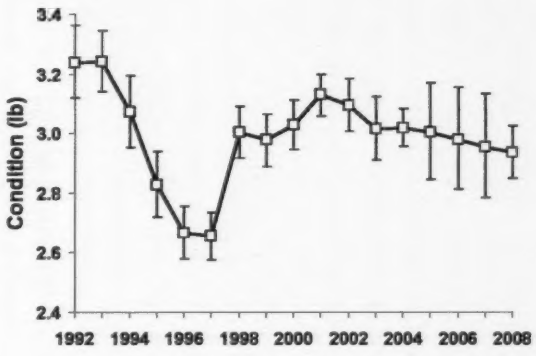

FIG. 2.4.3. Lake whitefish condition (lb) standardized for a fish of length 21 inches (480 mm fork length) caught in summer index gillnets, 1992-2008. Only fish >=age-5 years were included in the analysis.

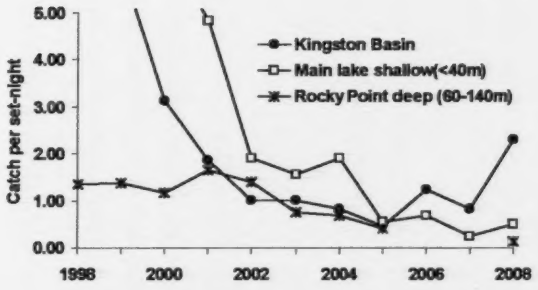

FIG. 2.4.4. Catch per unit effort of adult lake trout in bottom-set gillnets in three areas of eastern lake Ontario. Deep sets off Rocky Point were not fished in 2006 and 2007.

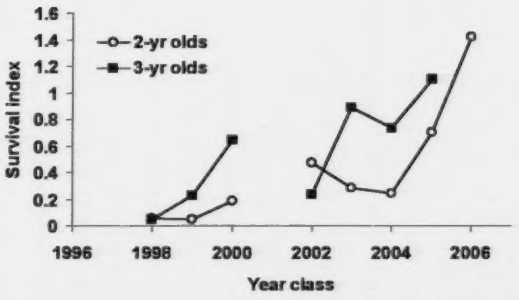

FIG. 2.4.5. Lake trout relative survival to ages 2 and 3. The survival index is the catch per unit effort of 2 and 3 year old fish, corrected for number stocked 2 or 3 years earlier; age determination is based on of year-specific fin clip information combined with the size of the fish.

2.5 Eastern Lake Ontario and Bay of Quinte Fish Community Index Trawling

Bottom trawling at fixed sites (Fig. 2.5.1) in eastern Lake Ontario (ranging in depth from 21-100 m) and the Bay of Quinte (ranging in depth from 4 to 23 m) has occurred annually since 1972 (except 1989). Typically, ½ mile trawl drags using a three-quarter "Yankee Standard" No. 35 bottom trawl are made at Lake Ontario sites while ¼ mile drags using a three-quarter "Western" bottom trawl are made at Bay of Quinte sites. At the deep Rocky Point trawl site (100 m) the trawling distance is 1 mile. Bottom trawling is used primarily to monitor the abundance of small fish species and the young (e.g. age-0) of larger species. Species-specific catches in the 2008 trawling program are shown in Tables 2.5.1-2.5.10. Twenty-eight species and over 73,000 fish were caught in 91 bottom trawls in 2008. Yellow perch (27%), white perch (20%), alewife (17%), round goby (14%) and trout perch (7%) collectively made up 85% of the catch by number.

Lake Ontario Sites

EB02

Trawl catches were very low at EB02 in 2008; only four species, round goby, rainbow smelt, alewife and lake trout, were caught (Table 2.5.1). Threespine stickleback, having risen to high levels of abundance in the late 1990s, declined rapidly after 2003 and has been absent in the EB02 catches for the last two years.

EB03

Only five species were caught at EB03 in 2008. The most abundant species were round goby and alewife and these two species were more abundant in 2008 than the previous year. Round goby, having first appeared in the EB03 catches in 2004, now dominates the total catch (Table 2.5.2).

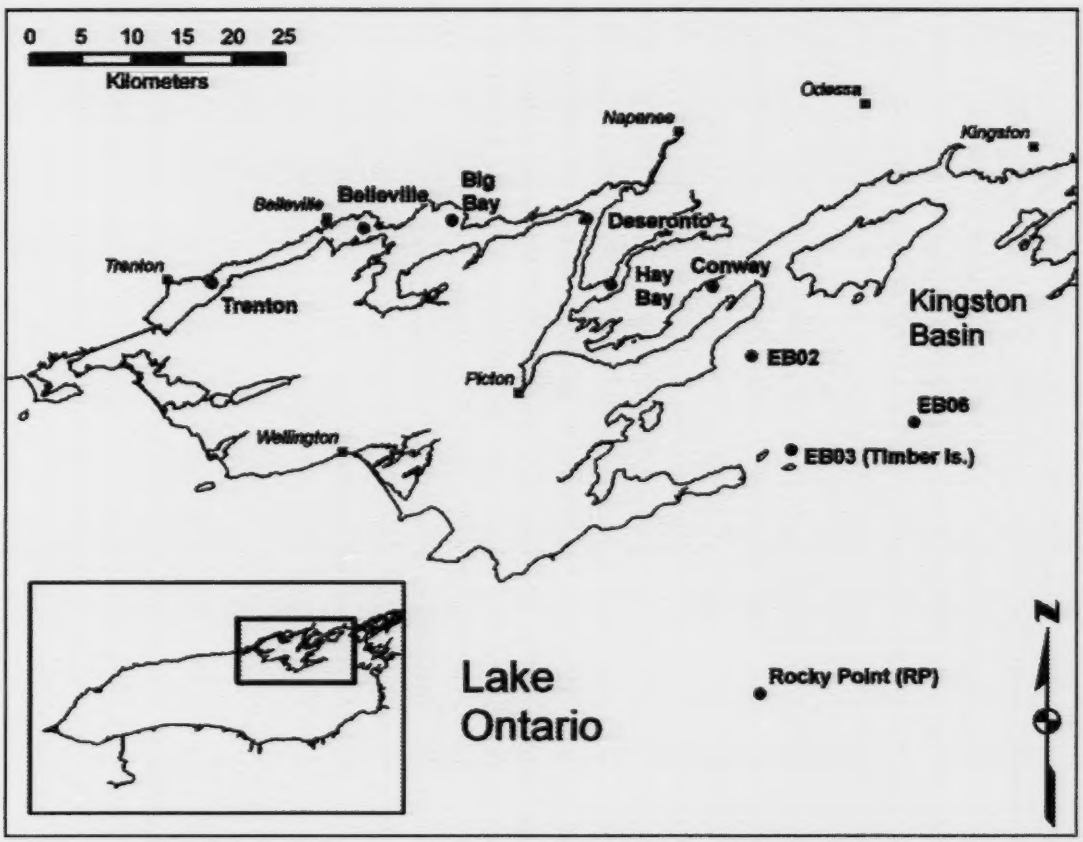

FIG. 2.5.1. Map of northeastern Lake Ontario. Shown are eastern Lake Ontario and Bay of Quinte fish community index bottom trawling site locations.

EB06

Trawl catches at EB06 were extremely low in 2008; only three species, round goby, rainbow smelt and alewife, were caught (Table 2.5.3).

Rocky Point

Five species were caught at the deep (100 m) Rocky Point site, slimy sculpin, rainbow smelt, alewife, lake trout and deepwater sculpin (Table 2.5.4). This is the only Lake Ontario trawl site where sculpin were caught. Round goby have yet to be captured at this site. Two deepwater sculpin were captured in 2008.

Bay of Quinte Sites

Trenton

Nineteen species were caught at Trenton in 2008. The most abundant species were yellow perch, pumpkinseed, spottail shiner, gizzard shad and white perch (Table 2.5.5).

Belleville

Nineteen species were caught at Belleville in 2008. White perch, gizzard shad and yellow perch were the most abundant species in the catch at Belleville, 2008 (Table 2.5.6).

Big Bay

Twenty species were caught at Big Bay in 2008. The most abundant species were yellow perch, white perch and alewife (Table 2.5.7).

Deseronto

Sixteen species were caught at Deseronto in 2008. The most abundant species were trout-perch, yellow perch, white perch, alewife gizzard shad and spottail shiner (Table 2.5.8).

Hay Bay

Eighteen species were caught at Hay Bay in 2008. The most abundant species were alewife, white perch and yellow perch (Table 2.5.9).

Conway

Ten species were caught at Conway in 2008. The most abundant species were alewife, yellow perch, round goby and trout-perch (Table 2.5.10).

Species Highlights

Catches of age-0 fish in 2008 for selected species and locations are shown in Tables 2.5.11-2.5.14 for lake whitefish, lake herring, yellow perch and walleye respectively. Age-0 lake whitefish catches were very low; none was caught at Timber Island and only three fish were caught at Conway in 2008 (Table 2.5.11). Age-0 lake herring catches at Conway were low in 2008 having been generally moderate to high in the last few years (Table 2.5.12). Age-0 catches of yellow perch were very high at the upper Bay of Quinte sites but relatively low at Hay Bay and Conway (Table 2.5.13). Age-0 walleye catches were higher in 2008 than any year since 1994 (Table 2.5.14).

Age-0, age-1 and age-2 walleye were all common in bottom trawl catches (Table 2.5.15).

Site-specific round goby catches are summarized in Table 2.5.16. Round goby first appeared in bottom trawl catches in the Bay of Quinte in 2001 and in the Kingston Basin of eastern Lake Ontario in 2003. The species was caught at all Bay of Quinte trawling sites by 2003, peaking in abundance, at each site, between 2003 and 2005. Catches declined precipitously in 2006, rebounded in 2007, and declined again in 2008. Round goby catches in the Kingston Basin levelled off in 2008 having been increasing since they first appeared in 2003. Bottom trawl catches indicate that round goby are now distributed throughout the Bay of Quinte and the Kingston Basin.

Two rare deepwater sculpin (see Section 7.3) were caught at the Rocky Point deep water site (100 m) in 2008. The fish were 114 and 121 mm total length and weighed 15.5 and 18.9 g respectively (Table 2.5.17).

TABLE 2.5.1. Species-specific catch per trawl (12 min duration; 1/2 mile) by year in the fish community index bottom trawling program during summer at **EB02**, eastern Lake Ontario. Catches are the mean number of fish observed for the number of trawls indicated. Total catch and number of species caught are indicated.

	Year																	
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean
Alewife	4405.278	150.553	288.789	226.167	45.083	77.167	576.333	60.667	5152.700	203.333	20.917	19.500	27.100	0.000	0.417	11.000	0.667	662.686
Rainbow trout	0.000	0.000	0.000	0.000	0.000	0.167	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010
Lake trout	0.278	0.765	0.278	0.417	0.000	0.000	0.000	0.000	0.083	0.000	0.083	0.083	0.000	0.583	0.167	0.583	0.500	0.225
Lake whitefish	4.056	1.353	3.167	6.083	7.083	5.167	1.500	0.250	0.167	0.167	0.000	0.583	0.400	0.250	0.000	0.167	0.000	1.788
Cisco (Lake herring)	0.778	0.176	2.056	0.167	0.000	0.083	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.192
Coregonus sp.	0.000	0.000	0.056	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003
Rainbow smelt	1244.817	593.971	397.306	1047.750	352.383	283.417	14.417	4.417	29.583	29.667	7.917	0.917	5.000	19.750	28.750	3.583	5.667	239.371
Emerald shiner	0.000	0.000	0.000	0.000	0.083	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005
Burbot	0.000	0.000	0.000	0.000	0.083	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005
Threespine stickleback	0.056	0.000	0.000	0.083	0.750	4.583	14.500	25.167	75.417	18.750	34.417	49.500	6.200	9.000	0.167	0.000	0.000	14.035
Trout-perch	0.278	0.882	5.167	1.833	6.000	1.250	25.333	0.583	0.750	0.250	0.000	0.167	0.000	0.000	0.000	0.000	0.000	2.500
Yellow perch	0.111	0.000	0.056	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.700	0.333	0.083	0.000	0.000	0.075
Walleye	0.056	0.059	0.389	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.030
Johnny darter	0.056	0.000	0.556	0.000	0.000	0.000	0.000	0.083	0.000	0.000	0.000	0.000	0.400	0.000	0.000	0.000	0.000	0.064
Round goby	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.083	250.100	24.833	40.083	119.750	26.667	27.148
Slimy sculpin	1.889	1.529	3.833	0.167	2.500	1.417	1.333	4.083	2.000	0.417	0.667	44.083	74.900	0.750	0.167	0.000	0.000	8.220
Deepwater sculpin	0.000	0.000	0.000	0.000	0.083	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005
Total	5657.650	749.288	701.650	1282.667	414.050	373.250	633.417	95.250	5260.700	252.583	64.000	114.917	364.800	55.500	69.833	135.083	33.500	956.361
Number of species	11	8	11	8	9	8	6	7	7	6	5	8	8	7	7	5	4	17
Number of trawls	18	17	18	12	12	12	12	12	12	12	12	12	10	12	12	12	12	

TABLE 2.5.2. Species-specific catch per trawl (12 min duration; 1/2 mile) by year in the fish community index bottom trawling program during summer at **EB03**, eastern Lake Ontario. Catches are the mean number of fish observed for the number of trawls indicated. Total catch and number of species caught are indicated.

	Year																	
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean
Alewife	2366.830	420.308	924.583	875.750	446.500	313.338	284.000	0.000	721.425	57.375	21.375	8.000	168.375	14.833	15.250	33.917	156.325	278.835
Gizzard shad	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.016
Chinook salmon	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.667	0.000	0.000	0.000	0.049
Lake trout	1.083	0.083	4.583	1.375	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.424
Lake whitefish	0.917	4.750	89.417	20.250	3.750	10.625	0.000	0.000	0.000	0.000	0.000	43.938	2.333	50.000	3.000	1.417	0.000	14.342
Cisco (Lake herring)	0.000	0.333	1.667	0.625	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.164
Rainbow smelt	59.000	20.333	927.450	1646.125	170.250	1729.200	98.125	0.875	5.125	20.000	207.488	109.231	1.917	25.667	20.625	21.500	0.250	312.760
White sucker	0.833	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.083	0.000	0.005
Common carp	0.917	0.167	0.083	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.016
Spottail shiner	354.917	22.917	3.833	0.000	0.000	0.125	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.695
American eel	0.000	0.000	0.250	0.000	0.125	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.031
Brook stickleback	0.000	0.000	0.083	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005
Threespine stickleback	33.000	0.083	0.583	0.000	3.750	144.000	0.875	37.000	76.750	67.375	680.138	459.275	2781.625	116.083	8.500	0.000	0.000	273.502
Trout-perch	1663.200	938.017	2072.667	120.375	106.250	190.875	57.375	3.125	1049.800	175.000	592.200	56.294	255.083	3.417	3.750	0.417	0.000	351.540
White perch	0.000	0.083	0.083	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.018
Smallmouth bass	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008
Yellow perch	0.583	0.167	0.083	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.625	0.083	0.000	0.500	0.167	0.125	0.109
Walleye	1.250	0.750	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.063	0.000	0.000	0.125	0.000	0.000	0.066
Johnny darter	4.667	0.500	2.083	0.000	0.250	0.125	0.000	0.000	0.250	0.000	0.000	9.875	32.833	0.167	0.000	0.000	0.000	2.880
Round goby	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.333	732.358	850.325	910.133	1100.163	224.582
Freshwater drum	0.250	0.083	0.083	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.083	0.000	0.125	0.000	0.125	0.031
Sculpin sp.	0.000	0.000	0.000	0.000	1.750	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.109
Mottled sculpin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.688	0.000	0.000	0.000	0.000	0.000	0.043
Slimy sculpin	0.833	0.083	1.417	0.125	0.125	0.625	0.000	0.000	0.125	0.000	0.250	6.750	10.833	0.083	0.000	0.000	0.000	1.276
Total	4488.3	1408.7	4029.0	2664.6	733.4	2389.0	440.4	41.0	1854.1	319.8	1501.5	694.7	3253.5	943.3	902.2	968.1	1257.0	1462.5
Number of species	14	15	16	7	11	9	4	3	10	4	5	10	10	9	9	9	5	24
Number of trawls	12	12	12	8	8	8	8	8	8	8	8	16	12	12	8	12	8	160

TABLE 2.5.3. Species-specific catch per trawl (12 min duration; 1/2 mile) by year in the fish community index bottom trawling program during summer at **EB06**, eastern Lake Ontario. Catches are the mean number of fish observed for the number of trawls indicated. Total catch and number of species caught are indicated.

	Year																	
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean
Alewife	540.442	84.308	42.250	46.417	16.333	0.000	16.000	24.833	0.000	5.583	0.250	0.083	1.250	0.417	8.000	0.917	0.667	46.338
Lake trout	2.167	0.917	1.000	0.750	0.333	0.167	0.083	0.000	0.083	0.083	0.083	0.083	0.083	0.000	0.000	0.000	0.000	0.343
Lake whitefish	0.917	24.667	3.250	8.333	3.000	0.000	0.583	0.083	0.083	0.000	0.167	0.167	0.250	0.000	0.000	0.083	0.000	2.446
Cisco (Lake herring)	0.083	0.000	0.000	0.167	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015
Rainbow smelt	1294.233	697.400	383.167	2457.500	661.750	264.667	471.750	346.650	115.917	21.417	6.750	0.250	25.083	142.583	23.917	0.583	1.000	406.742
Threespine stickleback	0.000	0.000	0.000	0.000	0.000	0.083	0.250	59.500	9.667	2.583	47.750	11.417	7.500	13.917	1.083	0.000	0.000	9.044
Trout-perch	0.250	0.917	1.917	3.667	0.667	0.750	0.667	0.000	0.083	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.525
Yellow perch	0.083	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.083	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010
Johnny darter	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.333	0.000	0.000	0.000	0.000	0.020
Round goby	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.000	82.925	1.667	5.270
Sculpin sp.	0.083	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005
Slimy sculpin	0.000	0.000	0.083	0.000	0.000	0.583	0.000	0.083	0.000	0.083	0.000	3.583	399.158	15.750	0.250	0.000	0.000	24.681
Total	1838.3	808.2	431.7	2516.8	682.1	266.3	489.3	431.2	125.9	29.8	55.0	15.6	433.7	172.7	38.3	84.5	3.3	495.4
Number of species	8	5	6	6	5	5	6	5	6	5	5	6	7	4	5	4	3	12
Number of trawls	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	

TABLE 2.5.4. Species-specific catch per trawl (12 min duration; 1/2 mile) by year in the fish community index bottom trawling program during summer at **Rocky Point**, eastern Lake Ontario. Catches are the mean number of fish observed for the number of trawls indicated. Total catch and number of species caught are indicated.

Species	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean
Alewife	11.000	5.250	0.000	0.250	5.500	0.750	3.000	11.500	0.250		13.750	3.000	4.9
Lake trout	0.000	0.000	0.000	0.500	1.000	0.000	0.000	0.250	0.000		0.000	0.250	0.2
Lake whitefish	0.000	0.000	0.000	0.750	0.000	0.250	0.000	0.000	0.000		0.000	0.000	0.1
Rainbow smelt	378.000	844.250	161.250	220.500	159.500	75.250	8.250	22.750	11.000		4.500	14.500	172.7
Threespine stickleback	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.250		0.000	0.000	0.0
Slimy sculpin	16.000	16.000	7.250	5.750	0.500	0.250	4.500	191.500	28.500		49.500	17.750	30.7
Deepwater sculpin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250		1.500	0.500	0.2
Total	405.0	865.5	168.5	227.8	166.5	76.5	15.8	226.3	40.3		69.3	36.0	208.8
Number of species	3	3	2	5	4	4	3	5	5		4	5	7
Number of trawls	5	4	4	4	2	4	4	4	4	0	4	4	

TABLE 2.5.5. Species-specific catch per trawl (6 min duration; 1/4 mile) by year in the fish community index bottom trawling program at **Trenton** (4 m depth), Bay of Quinte. Catches are the total number of fish observed at each site for the number of trawls indicated. Total catch and number of species caught are indicated.

	Year																	
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean
Alewife	34.250	154.075	12.250	109.125	13.875	5.750	1.125	246.075	25.625	149.288	98.600	174.113	8.625	508.825	126.625	24.500	8.750	100.087
Gizzard shad	29.625	54.000	691.450	369.750	23.875	114.400	4.125	131.750	68.438	4.125	6.375	22.250	0.000	30.375	23.375	1.375	38.500	94.929
Rainbow smelt	0.000	0.000	0.125	0.000	0.000	0.000	0.375	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.029
Northern pike	0.000	0.000	0.250	0.125	0.000	0.125	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.044
Mooneye	0.375	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.029
White sucker	11.000	6.000	1.875	3.375	1.875	0.625	0.375	1.875	0.000	0.500	1.625	0.625	1.125	1.875	2.125	2.125	0.375	2.199
Minnow	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007
Common carp	1.250	1.000	0.000	0.000	0.000	0.000	0.125	0.125	0.000	0.000	0.250	0.000	0.000	0.000	0.250	0.000	0.000	0.176
Spottail shiner	19.250	54.125	206.825	188.750	55.000	163.750	3.750	104.500	0.250	217.400	60.875	60.875	1.250	24.500	41.750	0.000	76.000	75.226
Brown bullhead	15.750	22.375	20.000	20.375	24.875	60.875	9.375	61.250	3.000	10.625	3.500	4.250	1.125	8.750	3.750	4.500	1.375	16.221
Channel catfish	0.000	0.625	0.000	0.000	0.125	1.375	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125
American eel	0.125	0.250	1.375	0.125	0.250	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.132
Burbot	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007
Trout-perch	23.875	44.875	79.375	43.250	28.875	21.250	2.250	0.500	0.000	0.500	0.500	0.000	0.000	0.125	0.125	0.000	0.250	14.456
White perch	16.125	38.125	601.725	304.500	322.325	1457.650	21.375	126.250	1.500	54.250	19.875	240.000	80.775	278.988	388.213	29.875	33.750	236.194
White bass	0.125	0.250	0.750	0.750	0.375	1.250	0.000	0.125	0.000	0.000	0.125	0.000	0.000	0.000	1.250	0.125	0.000	0.301
Sunfish	0.000	3.875	0.750	93.375	0.000	0.000	0.750	25.125	0.000	33.250	0.000	22.375	0.000	0.000	11.500	0.000	0.875	11.287
Rock bass	0.000	0.000	0.625	0.500	2.500	0.125	0.125	0.000	4.125	0.625	0.625	0.125	0.000	0.500	2.250	0.000	1.250	0.787
Pumpkinseed	4.500	24.000	15.875	21.000	79.375	90.375	55.875	113.250	372.850	84.750	32.250	88.875	56.788	46.750	20.000	77.513	143.775	78.106
Bluegill	0.000	0.125	0.250	0.375	1.375	0.000	0.000	0.375	4.250	1.125	0.500	1.500	0.875	0.375	3.875	5.250	2.625	1.346
Smallmouth bass	0.000	0.375	0.000	0.000	0.625	2.000	0.250	0.250	1.500	0.375	0.250	0.500	0.500	0.125	0.000	0.000	0.125	0.404
Largemouth bass	0.000	0.000	0.000	4.375	1.000	7.750	0.625	5.375	1.000	2.375	2.875	4.625	0.125	6.625	4.250	0.125	6.375	2.794
Black crappie	0.250	1.750	9.000	2.875	1.000	0.250	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.897
Lepomis sp.	0.000	0.000	6.875	0.000	0.000	0.000	0.000	0.000	0.000	0.000	64.788	0.000	0.000	59.750	10.250	0.000	17.000	9.333
Yellow perch	63.000	293.838	526.525	960.625	122.613	523.263	33.375	101.625	234.800	200.625	239.000	544.613	186.375	340.825	130.125	584.738	769.538	344.441
Walleye	10.000	17.875	23.750	20.250	8.500	5.375	0.500	1.625	0.000	9.625	3.625	10.500	1.500	1.875	0.750	4.750	7.375	7.522
Johnny darter	0.000	1.375	1.250	34.750	8.625	2.625	0.375	0.125	0.000	2.500	7.250	7.625	0.375	0.000	0.000	0.000	0.000	3.934
Logperch	0.250	0.625	0.375	3.875	5.500	8.125	8.375	0.125	0.625	2.000	0.000	15.250	4.250	52.750	0.625	5.625	23.375	7.750
Brook silverside	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.000	0.125	0.000	0.022
Round goby	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.875	8.500	13.125	5.250	0.750	12.375	2.522
Freshwater drum	1.625	22.750	12.125	46.625	9.375	3.875	5.125	5.375	0.500	6.750	3.625	2.000	0.375	4.125	4.875	9.500	1.500	8.243
Total	231.5	742.4	2213.4	2228.8	711.9	2470.8	148.3	925.8	718.6	780.9	546.5	1203.2	352.6	1380.4	781.2	750.9	1145.2	1019.6
Number of species	18	22	22	21	21	20	19	20	14	20	19	19	15	19	20	15	19	31
Number of trawls	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	

TABLE 2.5.6. Species-specific catch per trawl (6 min duration; 1/4 mile) by year in the fish community index bottom trawling program at **Belleville** (5 m depth), Bay of Quinte. Catches are the total number of fish observed at each site for the number of trawls indicated. Total catch and number of species caught are indicated.

	Year																	
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean
Sea lamprey	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007
Alewife	45.125	501.913	2.250	198.750	31.625	0.125	23.750	11.250	13.375	0.250	82.375	0.125	11.500	13.875	9.750	0.125	34.875	57.708
Gizzard shad	6.125	11.625	31.250	163.250	0.250	77.238	81.125	245.875	1762.000	99.200	234.363	46.025	581.775	50.563	88.325	73.313	326.875	228.187
Rainbow smelt	0.000	0.000	0.000	0.000	0.000	0.000	0.875	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.059
Northern pike	0.250	0.250	0.125	0.125	0.125	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.059
Mooneye	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007
White sucker	3.000	1.000	11.250	1.250	3.375	2.125	0.375	0.750	0.500	0.375	0.375	0.500	0.125	0.000	0.750	0.250	0.250	1.544
Common carp	0.500	0.125	1.125	0.375	0.250	0.000	0.000	0.500	0.000	0.125	0.125	0.625	0.000	0.500	0.625	0.250	0.125	0.309
Spottail shiner	32.000	160.625	115.125	123.250	49.375	21.500	15.875	103.125	19.375	10.625	21.500	4.750	3.875	13.250	23.875	3.750	17.375	43.485
Brown bullhead	27.625	10.750	36.125	9.875	8.625	9.375	10.750	25.000	22.500	32.000	10.875	5.375	17.875	15.000	14.875	9.375	6.000	16.000
Channel catfish	0.000	0.000	0.250	0.000	0.250	0.000	0.125	0.000	0.000	0.000	0.125	0.125	0.000	0.375	0.000	0.000	0.000	0.074
American eel	0.375	0.375	0.750	0.125	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.103
Burbot	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007
Trout-perch	179.875	53.500	302.000	6.000	118.500	24.875	2.000	1.125	13.625	13.000	5.500	12.750	14.375	9.750	4.000	14.250	19.000	46.713
White perch	34.250	149.500	122.000	496.375	714.338	658.600	44.500	251.000	205.013	6.625	154.625	165.013	1929.950	475.900	880.563	338.925	845.013	439.540
White bass	0.250	0.250	0.125	1.250	0.750	8.250	0.250	0.375	0.000	0.125	3.000	1.625	3.625	2.000	6.000	0.250	1.000	1.713
Sunfish	0.000	0.000	0.250	0.000	0.000	0.000	21.875	18.125	0.000	48.125	0.000	14.625	0.000	0.000	14.500	0.000	42.125	9.390
Rock bass	1.000	0.125	0.375	0.000	0.000	0.000	0.000	0.000	0.625	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125
Pumpkinseed	0.375	10.750	2.375	0.125	10.375	37.750	4.875	13.750	145.663	21.750	5.125	1.875	4.125	1.750	1.125	0.875	0.500	15.480
Bluegill	0.000	0.000	0.000	0.875	0.125	0.000	0.000	0.000	119.863	0.250	0.500	0.125	0.000	0.375	1.250	1.875	0.000	7.367
Smallmouth bass	0.000	0.250	0.000	0.000	0.875	0.500	0.000	0.000	0.875	0.125	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.162
Largemouth bass	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	1.250	0.125	0.375	0.250	0.625	0.375	0.000	0.125	0.625	0.228
Black crappie	2.125	1.750	0.375	22.125	0.250	0.375	0.250	0.500	2.625	0.375	0.000	0.000	0.250	0.125	2.000	0.375	0.250	1.985
Lepomis sp.	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	88.375	0.000	2.375	409.700	0.250	5.125	8.000	30.232
Yellow perch	8.500	46.375	50.625	176.375	190.875	63.875	38.125	29.000	429.625	37.875	53.250	14.250	66.250	47.375	14.625	78.750	214.725	91.793
Walleye	18.875	22.625	33.250	11.250	10.625	11.750	3.625	0.750	5.500	5.375	0.750	8.500	2.625	2.000	2.750	8.625	18.125	9.824
Johnny darter	0.125	0.125	0.000	0.250	5.750	1.750	4.500	0.000	0.250	12.500	2.125	0.125	0.000	0.000	0.000	0.000	0.000	1.618
Logperch	0.125	0.000	0.000	0.000	2.125	0.000	0.250	0.000	0.625	0.250	0.500	0.125	0.125	0.125	0.000	0.750	1.000	0.353
Brook silverside	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.250	0.000	0.000	0.500	0.000	0.000	0.000	1.250	0.000	0.000	0.176
Round goby	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.625	67.000	47.250	60.250	7.125	53.875	8.625	14.456
Freshwater drum	6.125	12.125	36.375	6.500	27.875	17.750	70.000	25.000	5.750	163.750	58.250	20.875	4.375	214.763	87.000	830.063	25.000	94.799
Sculpin sp.	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007
Total	366.6	984.2	746.3	1218.1	1176.3	936.1	323.5	727.5	2749.0	452.8	724.4	364.7	2691.1	1318.1	1160.6	1420.9	1569.5	1113.5
Number of species	19	20	21	18	20	17	21	17	18	20	22	20	17	19	19	19	19	32
Number of trawls	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	

TABLE 2.5.7. Species-specific catch per trawl (6 min duration; 1/4 mile) by year in the fish community index bottom trawling program at **Big Bay** (5 m depth), Bay of Quinte. Catches are the total number of fish observed at each site for the number of trawls indicated. Total catch and number of species caught are indicated.

	Year																	
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean
Longnose gar	0.375	0.250	0.125	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.074
Alewife	10.375	93.500	2.250	173.000	1.875	0.625	0.000	19.625	0.500	0.000	224.938	0.000	407.363	35.750	13.000	0.375	190.263	69.026
Gizzard shad	92.375	73.000	11.500	1482.250	39.075	4.375	0.125	337.500	12.750	0.000	52.250	23.250	58.375	25.875	2.250	2.250	68.738	134.467
Rainbow smelt	0.000	0.000	0.000	0.000	0.000	0.500	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.037
Northern pike	0.000	0.250	0.125	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.037
White sucker	2.250	2.125	6.750	8.250	5.125	1.875	9.625	3.250	0.375	0.750	2.875	1.125	1.375	0.875	0.125	0.375	0.375	2.794
Moxostoma sp.	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007
Common carp	2.000	0.875	1.000	0.125	0.125	0.250	0.000	0.125	0.375	0.250	0.000	0.500	0.375	0.250	0.875	0.125	0.375	0.449
Emerald shiner	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.375	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.022
Spottail shiner	7.875	4.750	38.250	45.375	4.250	11.375	8.000	26.625	4.000	12.125	63.625	8.875	20.250	56.250	18.625	15.375	10.625	20.956
Brown bullhead	18.875	35.750	64.125	11.000	21.625	16.750	29.375	61.500	19.875	16.375	32.625	38.000	23.750	12.125	54.625	9.750	8.750	27.934
Channel catfish	0.000	0.000	0.625	0.375	0.125	0.000	0.250	0.000	0.000	0.000	0.125	0.000	0.000	0.125	0.375	0.000	0.000	0.118
Ictalurus sp.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.375	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.022
American eel	0.250	0.375	0.875	0.375	0.625	0.375	0.375	0.000	0.000	0.125	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.206
Trout-perch	41.500	10.875	72.375	4.625	27.375	7.125	23.000	30.750	1.750	1.375	9.125	5.000	3.125	21.625	21.000	14.000	65.875	21.206
White perch	113.250	134.000	178.250	789.000	1310.425	851.063	399.500	329.500	368.075	18.250	793.025	145.125	1498.975	554.588	1252.238	363.425	456.700	562.082
White bass	0.125	0.125	0.750	2.000	3.250	7.375	0.250	0.375	0.000	0.000	2.125	0.000	0.250	2.625	3.875	0.250	0.750	1.419
Sunfish	0.000	0.000	0.000	0.000	0.000	0.000	0.000	15.375	0.000	50.000	0.000	0.000	0.000	0.000	25.250	0.000	9.750	5.904
Rock bass	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.007
Pumpkinseed	0.125	13.125	1.125	0.375	15.250	19.750	39.625	2.000	87.625	83.875	64.125	67.625	36.625	3.750	6.875	1.875	5.750	26.441
Bluegill	0.000	0.000	0.000	0.250	0.250	4.750	3.875	0.125	11.625	124.875	13.625	14.625	0.750	9.625	6.750	16.000	3.875	12.412
Smallmouth bass	0.000	0.000	0.000	0.000	0.125	0.000	0.250	0.000	0.000	0.125	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.044
Largemouth bass	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.250	0.000	0.000	0.000	0.125	0.037
Black crappie	0.000	0.000	0.000	0.375	1.000	1.250	0.250	0.250	0.750	0.625	0.500	0.375	0.375	1.000	2.625	0.250	0.125	0.574
Lepomis sp.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	66.625	0.000	0.000	1060.175	0.000	4.125	56.475	69.847
Yellow perch	2.625	11.250	10.250	17.375	62.875	80.250	222.500	16.500	45.889	381.125	153.463	107.650	200.250	90.613	99.388	33.750	660.600	129.197
Walleye	18.875	8.625	18.625	8.625	14.750	10.250	10.125	3.125	2.875	7.500	6.125	19.250	16.875	6.500	8.125	8.750	28.125	11.596
Johnny darter	0.000	0.000	0.000	0.000	0.000	0.000	0.500	0.000	0.000	1.250	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.118
Logperch	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.125	0.000	0.250	0.000	0.000	0.125	0.250	3.250	0.243
Brook silverside	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.625	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.044
Round goby	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	1.375	15.750	9.500	4.750	50.413	1.125	4.885
Freshwater drum	2.500	15.000	20.375	4.250	7.125	12.375	24.375	9.500	10.250	21.750	24.375	9.000	15.625	125.500	178.450	139.350	14.625	37.319
Total	313.4	403.9	427.4	2547.9	1515.3	1030.4	772.1	857.1	567.0	720.9	1510.8	442.0	2300.3	2016.8	1699.5	660.9	1586.3	1139.5
Number of species	15	16	17	18	18	18	18	18	16	18	23	15	17	18	20	19	20	30
Number of trawls	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	

TABLE 2.5.8. Species-specific catch per trawl (6 min duration; 1/4 mile) by year in the fish community index bottom trawling program at **Deseronto** (5 m depth), Bay of Quinte. Catches are the total number of fish observed at each site for the number of trawls indicated. Total catch and number of species caught are indicated.

	Year																	
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean
Longnose gar	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007
Alewife	226.500	496.288	128.388	156.000	38.625	6.250	0.000	23.500	9.625	180.063	47.625	277.350	55.375	54.213	106.263	1037.375	217.088	180.031
Gizzard shad	121.538	35.250	94.175	27.375	150.563	1.375	22.500	36.125	0.000	32.000	20.875	11.875	1.375	22.000	62.100	29.250	109.375	45.750
Rainbow smelt	0.125	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015
Northern pike	0.000	0.125	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.022
White sucker	3.875	2.000	0.875	0.000	1.500	0.125	0.250	0.250	0.375	0.625	0.375	1.250	1.250	0.125	0.375	0.375	0.625	0.838
Common carp	0.250	0.125	0.500	1.250	0.375	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.154
Spottail shiner	28.125	23.000	38.250	115.625	7.125	14.125	6.875	29.625	0.000	25.250	25.000	35.625	1.500	18.875	54.750	28.750	104.125	32.743
Brown bullhead	21.875	47.500	41.125	9.625	43.875	13.250	15.375	21.875	3.750	69.250	10.625	21.500	37.000	12.500	11.625	18.125	2.500	23.610
Channel catfish	0.000	0.125	0.500	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.250	0.125	0.000	0.000	0.074
Ictalurus sp.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007
American eel	1.125	2.000	2.875	0.000	0.750	0.250	0.250	0.000	0.500	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.463
Trout-perch	92.500	54.125	89.500	39.125	10.250	0.125	15.125	0.875	14.500	4.750	7.500	0.125	4.500	6.000	12.375	18.375	550.213	54.115
White perch	147.000	29.375	141.125	481.625	87.875	249.300	73.750	544.413	703.788	10.250	194.863	306.238	3075.588	237.588	793.925	226.200	298.113	447.118
White bass	0.125	0.125	1.875	0.625	0.375	0.500	0.000	0.000	0.000	0.000	0.000	0.500	1.625	1.250	4.250	0.375	0.000	0.684
Sunfish	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.875	0.000	0.375	0.000	0.000	0.000	0.000	1.375	0.000	0.125	0.176
Rock bass	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	1.750	0.250	0.000	0.000	0.000	0.000	0.000	0.132
Pumpkinseed	0.125	2.750	0.875	0.375	33.250	18.625	12.625	17.125	49.625	118.088	17.500	67.500	19.500	14.750	15.500	19.125	11.500	24.638
Bluegill	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.500	0.125	4.500	0.000	0.125	0.875	0.375	0.000	0.390
Smallmouth bass	0.000	0.000	0.000	0.375	0.750	0.375	0.000	1.625	1.375	0.500	0.125	1.000	1.250	0.625	0.250	0.000	0.000	0.485
Largemouth bass	0.000	0.000	0.000	0.375	0.000	0.250	0.000	0.125	0.000	0.000	1.125	0.000	0.250	1.125	2.125	0.000	0.125	0.324
Black crappie	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.125	0.625	0.125	0.000	1.750	1.375	4.875	0.000	0.537
Lepomis sp.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	483.675	0.000	1.000	0.250	28.525
Yellow perch	20.625	100.738	101.500	916.000	224.000	171.788	373.413	803.563	176.663	412.700	555.388	683.425	152.138	1030.913	638.313	1087.100	531.750	469.413
Walleye	51.375	20.625	39.625	22.250	12.125	3.375	2.625	3.250	2.125	12.500	2.875	7.500	15.125	5.000	5.250	9.875	19.875	13.846
Johnny darter	0.125	0.000	0.000	0.000	0.375	0.125	2.000	0.000	1.000	0.625	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250
Logperch	0.000	0.000	0.000	0.000	1.625	0.375	0.000	0.000	0.500	1.000	0.125	0.375	0.000	3.625	0.125	0.750	2.875	0.669
Brook silverside	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.750	0.000	0.000	0.000	0.000	0.000	0.750	0.000	0.000	0.000	0.206
Round goby	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.250	11.500	16.125	20.625	117.300	4.625	4.250	4.500	10.599
Freshwater drum	7.250	7.625	23.625	3.250	21.000	6.750	6.125	1.250	5.125	16.500	1.875	15.375	15.625	8.250	22.000	24.000	10.125	11.515
Total	722.7	821.8	704.9	1773.9	634.6	487.2	531.2	1487.6	969.0	886.6	900.0	1450.8	3402.9	2020.8	1737.6	2510.2	1863.2	1347.3
Total of species	17	16	16	14	18	19	13	17	13	20	19	19	16	22	20	17	16	30
Number of trawls	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	128

TABLE 2.5.9. Species-specific catch per trawl (6 min duration; 1/4 mile) by year in the fish community index bottom trawling program at **Hay Bay** (7 m depth), Bay of Quinte. Catches are the total number of fish observed at each site for the number of trawls indicated. Total catch and number of species caught are indicated.

	Year																	
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean
Alewife	8.375	21.125	198.625	256.500	19.250	21.250	122.225	1051.200	466.556	565.963	21.125	1.750	67.063	72.088	394.425	695.188	631.613	271.430
Gizzard shad	0.000	0.250	2.500	39.875	2.250	0.000	0.000	0.750	46.000	2.625	0.125	0.000	0.125	0.000	0.375	0.125	7.000	6.000
Cisco (Lake herring)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.059
Rainbow smelt	2.000	1.000	0.000	0.250	0.000	0.125	0.000	0.125	0.125	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.375	0.243
Northern pike	0.125	0.000	0.000	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.125	0.000	0.051
White sucker	7.625	6.875	2.375	0.500	0.750	3.250	1.875	4.750	1.500	3.500	0.125	5.875	8.250	0.000	0.625	4.875	3.000	3.279
Common carp	0.125	2.000	0.625	0.250	0.000	0.000	0.000	0.125	0.000	0.250	0.000	0.000	0.000	0.875	0.000	0.000	0.750	0.294
Common shiner	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.007
Spottail shiner	5.875	21.500	8.000	22.625	77.625	13.125	57.625	134.625	4.875	63.513	54.000	53.250	64.375	79.113	133.950	188.575	47.750	60.612
Brown bullhead	4.625	9.125	14.125	30.500	0.500	1.750	59.375	22.250	20.375	32.750	15.750	8.000	10.375	10.500	15.000	8.875	0.750	15.566
Channel catfish	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015
American eel	4.375	0.875	6.375	0.125	1.875	0.250	0.250	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.838
Burbot	0.000	0.000	0.000	0.125	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015
Trout-perch	119.000	34.625	82.875	10.750	249.500	19.500	2.250	18.500	1.625	5.750	2.750	3.750	77.500	1.750	3.000	59.500	6.625	41.132
White perch	26.000	85.875	34.875	59.125	6.125	297.563	6.625	565.213	59.250	9.250	132.563	14.750	495.163	24.625	504.113	27.500	163.738	147.785
White bass	0.000	0.000	1.375	0.000	0.000	0.250	0.000	0.000	0.125	0.000	0.000	1.750	0.125	0.125	1.375	1.375	0.875	0.434
Sunfish	0.000	0.375	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.029
Rock bass	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.015
Pumpkinseed	0.000	1.000	2.250	7.875	0.125	2.750	4.875	76.875	24.500	19.625	11.875	0.750	4.625	1.125	44.500	11.375	8.625	13.103
Bluegill	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	3.625	0.221
Smallmouth bass	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.250	0.000	0.000	0.000	0.000	0.000	0.000	0.074
Largemouth bass	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	1.750	0.000	0.000	0.000	0.000	0.000	0.375	0.140
Black crappie	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.375	0.875	0.000	0.000	0.132
Lepomis sp.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.375	0.000	0.000	0.000	0.787
Yellow perch	21.250	23.375	29.250	417.500	145.113	560.963	539.125	1488.375	658.125	726.475	856.588	119.200	551.850	278.638	580.700	906.500	138.063	473.005
Walleye	9.875	13.125	14.750	12.250	2.000	2.625	2.375	12.125	2.250	7.125	3.250	1.750	3.125	4.125	7.125	8.500	13.375	7.044
Johnny darter	0.000	0.000	0.000	0.000	0.625	0.125	0.000	0.000	0.000	0.000	1.750	0.000	0.000	0.000	0.000	0.125	0.000	0.154
Logperch	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.250	0.000	0.250	0.000	0.000	0.125	0.375	0.250	1.250	0.250	0.176
Round goby	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	1.250	14.250	3.500	40.125	6.000	17.125	11.375	5.515
Freshwater drum	0.375	16.250	0.375	1.000	2.375	1.750	0.750	1.375	1.750	4.375	4.875	6.875	10.500	16.375	39.125	6.000	5.000	7.007
Slimy sculpin	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007
Total	209.6	237.6	398.4	859.3	509.0	925.4	797.5	3376.8	1287.1	1442.8	1109.0	232.1	1296.8	544.6	1731.7	1937.1	1043.2	1055.2
Number of species	13	16	14	15	16	15	12	16	13	16	15	13	15	15	17	17	18	31
Number of trawls	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	

TABLE 2.5.10. Species-specific catch per trawl (6 min duration; 1/4 mile) by year in the fish community index bottom trawling program at **Conway** (24m depth), Bay of Quinte. Catches are the total number of fish observed at each site for the number of trawls indicated. Total catch and number of species caught are indicated.

	Year																	
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean
Silver lamprey	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.083	0.000	0.000	0.000	0.000	0.005
Alewife	345.338	66.250	35.425	1.625	83.125	245.325	0.000	0.000	248.625	0.000	0.000	2.250	1.917	0.417	9.667	0.083	214.558	73.800
Gizzard shad	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.167	0.000	0.000	0.076
Chinook salmon	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.167	0.083	0.000	0.000	0.029
Brown trout	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.167	0.000	0.000	0.000	0.000	0.000	0.017
Lake trout	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.250	0.000	0.417	0.000	0.000	0.000	0.000	0.047
Lake whitefish	28.500	4.250	40.875	28.000	7.000	6.375	0.375	0.000	2.250	1.000	1.000	8.083	0.750	3.083	3.833	4.750	0.250	8.257
Cisco (Lake herring)	0.125	2.750	15.375	1.375	0.000	0.000	0.125	0.000	0.000	0.000	0.250	3.000	0.083	7.667	4.500	2.000	0.167	2.201
Coregonus sp.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.083	0.000	0.000	0.000	0.000	0.000	0.005
Rainbow smelt	24.125	2.500	11.125	629.375	104.625	46.625	59.750	0.000	0.000	0.000	39.625	10.167	3.583	6.750	0.083	25.167	1.083	56.740
White sucker	19.250	2.250	1.250	0.125	1.500	1.375	1.000	0.750	15.250	134.825	28.750	6.667	7.417	4.750	3.167	11.250	0.500	14.122
Moxostoma sp.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007
Spottail shiner	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.625	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.037
Channel catfish	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015
American eel	0.500	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.037
Burbot	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.083	0.000	0.000	0.000	0.000	0.005
Threespine stickleback	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.083	0.000	0.000	0.000	0.000	0.000	0.005
Trout-perch	160.513	272.625	395.275	116.750	146.750	253.538	26.750	1.750	82.125	139.438	58.225	53.667	43.333	12.250	0.500	1.000	13.000	104.558
White perch	0.500	48.000	0.125	0.000	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.000	0.000	0.000	3.066
White bass	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.833	0.000	0.000	0.064
Rock bass	0.125	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015
Smallmouth bass	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007
Yellow perch	21.375	10.750	6.875	1.750	2.875	13.625	3.250	41.375	41.000	134.700	181.238	178.133	58.667	53.750	146.567	20.000	108.975	60.288
Walleye	4.875	23.250	13.625	3.500	1.625	0.125	1.250	0.125	0.000	1.250	0.000	0.250	1.000	0.083	0.417	0.417	0.083	3.051
Johnny darter	0.000	0.000	0.250	0.375	1.375	0.750	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.162
Round goby	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.500	282.225	79.167	127.208	40.833	173.192	89.717	46.638
Freshwater drum	0.000	0.375	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.250	0.000	0.083	0.500	0.000	0.083	0.083
Mottled sculpin	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007
Slimy sculpin	0.000	0.000	0.250	0.125	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.037
Total	605.2	433.9	520.8	783.0	348.9	568.6	92.5	44.0	389.4	412.1	310.0	545.0	196.5	216.2	215.2	237.9	428.4	373.4
Number of species	11	15	13	10	8	11	7	4	6	8	9	13	12	11	14	9	10	29
Number of trawls	8	8	8	8	8	8	8	8	8	8	8	12	12	12	12	12	12	

TABLE 2.5.11. Mean catch-per-trawl of age-0 **lake whitefish** at two sites, Conway in the lower Bay of Quinte and EB03 near Timber Island in eastern Lake Ontario, 1992-2008. Four replicate trawls on each of two to four visits during August and early September were made at each site. Distances of each trawl drag were 1/4 mile for Conway and 1/2 mile for EB03.

	Conway	N	EB03 (Timber Island)	N
1992	23.4	8	0.9	12
1993	3.1	8	4.7	12
1994	40.5	8	79.7	8
1995	27.1	8	17.1	8
1996	2.6	8	0.8	8
1997	5.1	8	6.0	8
1998	0.4	8	0.0	8
1999	0.0	8	0.0	8
2000	0.4	8	0.0	8
2001	0.1	8	0.0	8
2002	0.1	8	0.0	8
2003	8.1	12	44.9	16
2004	0.0	12	2.1	12
2005	2.8	12	49.8	12
2006	2.4	12	3.6	8
2007	0.8	12	0.3	12
2008	0.25	12	0.0	8

TABLE 2.5.12. Mean catch-per-trawl of age-0 **lake herring** at Conway in the lower Bay of Quinte, 1992-2008. Four replicate trawls on each of two to four visits during August and early September were made at the Conway site. Distances of each trawl drag was 1/4 mile.

	Conway	N
1992	0.0	8
1993	1.5	8
1994	7.7	8
1995	1.3	8
1996	0.0	8
1997	0.0	8
1998	0.1	8
1999	0.0	8
2000	0.0	8
2001	0.0	8
2002	0.1	8
2003	2.8	12
2004	0.1	12
2005	7.2	12
2006	4.5	12
2007	2.0	12
2008	0.2	12

TABLE 2.5.13. Mean catch-per-trawl of age-0 **yellow perch** at six Bay of Quinte sites, 1992-2008. Four replicate trawls on each of two to three visits during August and early September were made at each site. Distance of each trawl drag was 1/4 mile.

	Trenton	Belleville	Big Bay	Deseronto	Hay Bay	Conway	Mean	Number of trawls
1992	3.1	1.3	0.4	0.1	0.5	0.0	0.9	48
1993	203.7	14.0	0.4	36.3	1.6	0.3	42.7	48
1994	526.6	50.6	10.3	101.5	29.3	6.9	120.8	48
1995	730.4	101.1	9.5	764.5	268.9	0.0	312.4	48
1996	2.6	2.9	4.3	2.5	8.5	0.1	3.5	48
1997	302.0	4.0	36.0	135.0	526.0	0.0	167.2	48
1998	13.1	14.0	11.5	0.1	2.9	0.0	7.0	48
1999	24.5	7.0	4.9	638.7	900.3	0.0	262.6	48
2000	0.0	5.8	5.4	0.8	6.0	0.3	3.0	48
2001	158.0	27.6	16.8	71.8	127.0	0.0	66.9	48
2002	0.0	0.3	9.2	141.8	241.1	0.0	65.4	48
2003	228.5	3.8	0.9	9.2	1.6	0.5	40.8	52
2004	0.0	0.9	4.5	8.4	18.0	0.0	5.3	52
2005	202.8	37.5	24.8	444.7	61.9	0.0	128.6	52
2006	3.8	3.5	51.7	532.8	306.0	0.2	149.7	52
2007	284.3	70.9	29.6	883.5	776.0	0.1	340.7	52
2008	123.8	153.4	114.5	263.6	12.4	0.0	111.3	52

TABLE 2.5.14. Mean catch-per-trawl of age-0 **walleye** at six Bay of Quinte sites, 1992-2008. Four replicate trawls on each of two to three visits during August and early September were made at each site. Distance of each trawl drag was 1/4 mile.

	Trenton	Belleville	Big Bay	Deseronto	Hay Bay	Conway	Mean	Number of trawls
1992	6.8	12.4	14.0	37.9	6.1	0.8	13.0	48
1993	8.8	16.0	5.0	11.3	1.1	11.9	9.0	48
1994	17.0	21.0	15.0	23.8	11.5	12.5	16.8	48
1995	14.1	8.3	2.6	8.3	5.5	0.9	6.6	48
1996	4.3	7.6	4.9	1.1	0.0	1.1	3.2	48
1997	2.8	7.6	6.1	0.3	0.1	0.0	2.8	48
1998	0.1	0.4	0.6	0.1	0.0	0.0	0.2	48
1999	1.1	0.4	0.4	1.4	9.1	0.1	2.1	48
2000	0.0	3.8	1.0	0.0	0.1	0.0	0.8	48
2001	9.5	4.5	4.8	6.8	3.3	0.1	4.8	48
2002	0.0	0.0	1.1	0.1	0.0	0.0	0.2	48
2003	10.3	8.3	16.8	1.9	0.4	0.0	6.3	52
2004	0.0	0.6	11.4	1.4	0.9	0.0	2.4	52
2005	0.8	1.4	3.8	1.8	1.1	0.0	1.5	52
2006	0.0	1.0	3.0	2.8	5.9	0.3	2.1	52
2007	4.1	6.1	5.4	5.6	5.6	0.2	4.5	52
2008	5.5	17.6	20.5	14.6	12.4	0.0	11.8	52

TABLE 2.5.15. Age distribution of 652 walleye sampled from summer bottom trawls, Bay of Quinte, 2008. Also shown are mean fork length and mean weight. Fish of less than 150 mm fork length (n = 564) were assigned an age of 0, fish between 150 and 195 mm were aged using scales (n = 10); and those over 195 mm fork length (n = 78) were aged using otoliths.

	Age (years) / Year class						
	0	1	2	3	4	5	
	2008	2007	2006	2005	2004	2003	Total
Bay of Quinte	567	65	17	2	0	1	652
Mean fork length (mm)	116	226	317	426		465	
Mean weight (g)	17	118	334	838		1139	

TABLE 2.5.16. Mean catch-per-trawl of **round goby** at three Ontario and six Bay of Quinte sites, 1992-2008.

	EB02	EB03	EB06	Trenton	Belleville	Big Bay	Deseronto	Hay Bay	Conway	Lake Ontario	Bay of Quinte	Number of trawls
1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90
1993	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	85
1994	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90
1995	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	80
1996	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	80
1997	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	93
1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	92
1999	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	88
2000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	80
2001	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.1	0.0	0.0	0.2	80
2002	0.0	0.0	0.0	0.0	1.6	0.1	11.5	1.3	0.5	0.0	2.5	80
2003	0.1	0.0	0.0	2.9	67.0	1.4	16.1	14.3	282.2	0.0	64.0	92
2004	250.1	0.3	0.0	8.5	47.3	15.8	20.6	3.5	79.2	83.5	29.1	86
2005	24.8	732.4	0.0	13.1	60.3	9.5	117.3	40.1	127.2	252.4	61.3	88
2006	40.1	850.3	5.0	5.3	7.1	4.8	4.6	6.0	40.8	298.5	11.4	84
2007	175.1	910.1	82.9	0.8	53.9	50.4	4.3	17.1	173.2	389.4	49.9	84
2008	26.7	1100.2	1.7	12.4	8.6	1.1	4.5	11.4	89.7	376.2	21.3	84

TABLE 2.5.17. Biological attribute information for two deepwater sculpin caught at Rocky Point (100 m water depth) on June 30, 2008. Two trawls were made on that date.

	Fish	Total length (mm)	Weight (g)	Sex
Trawl 1	1	114	15.45	Male
Trawl 2	1	121	18.89	Female

2.6. Lake-wide Hydroacoustic Assessment of Prey Fish

The status of prey fish in Lake Ontario is assessed in hydroacoustic surveys conducted jointly since 1991 by Ontario Ministry of Natural Resources (OMNR) and New York State of Department of Environmental Conservation (NYSDEC). The surveys are conducted in mid-summer and cover the entire lake. The 2008 survey was conducted from Jul 31-Aug 6, and consisted of five north-south shore-to-shore transects in the main lake, and one transect in the Kingston Basin. Acoustic data used to estimate population densities were collected using a Biosonics 120 kHz split-beam echosounder. Midwater trawling was not possible in 2008 due to technical problems. Trawling is normally part of the hydroacoustic survey, providing data on species composition and biological attributes of the fish.

The alewife population estimate for 2008 is 243 million yearling-and-older fish. This is an increase from the previous year, but in line with the general population levels seen since 2003 (Fig. 2.6.1). The 2008 population estimate translates into a biomass estimate of 8178 MT.

The rainbow smelt population estimate for 2006 was 216 million yearling-and-older fish, which translates into a biomass estimate of 1680 MT (Fig. 2.6.2). As with alewife, the 2008 smelt population estimate is higher than the previous year's estimate, but in line with the low levels observed in recent years.

Three-spine sticklebacks are another species assessed in the hydroacoustic surveys, albeit only from the catches in the midwater trawls that accompany the acoustic data collection. A sharp decrease in abundance of the sticklebacks was observed in 2006-2007, leading to concerns about the future levels of this species. Unfortunately the status in 2008 could not be assessed because we could not conduct midwater trawls.

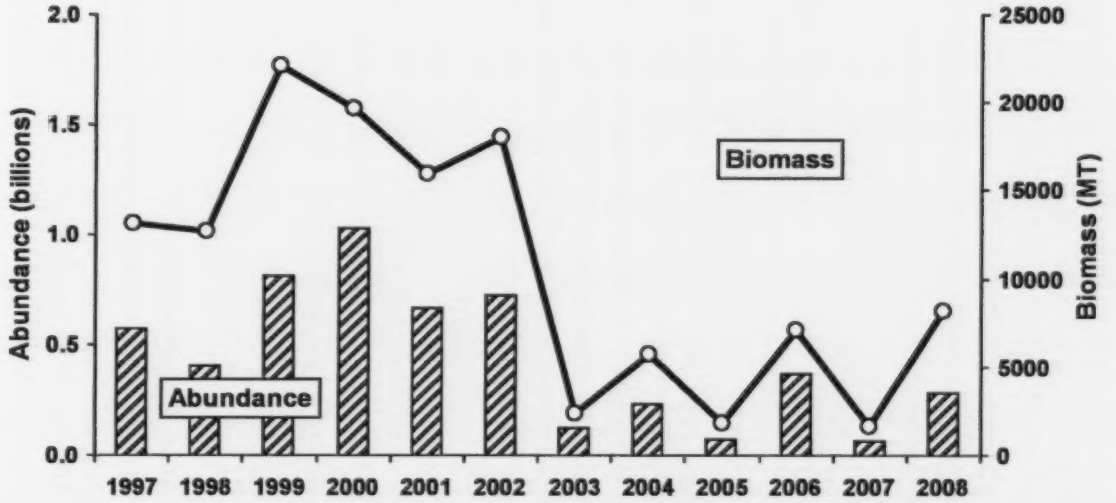

FIG. 2.6.1. Abundance and biomass of yearling-and-older **alewife**. Abundance estimates were obtained directly from hydroacoustic surveys, biomass estimates were obtained by applying average weights to abundance estimates. The weight information normally comes from midwater trawls done during the surveys, however information from other sources was used for years 2002, 2004, 2005, and 2008.

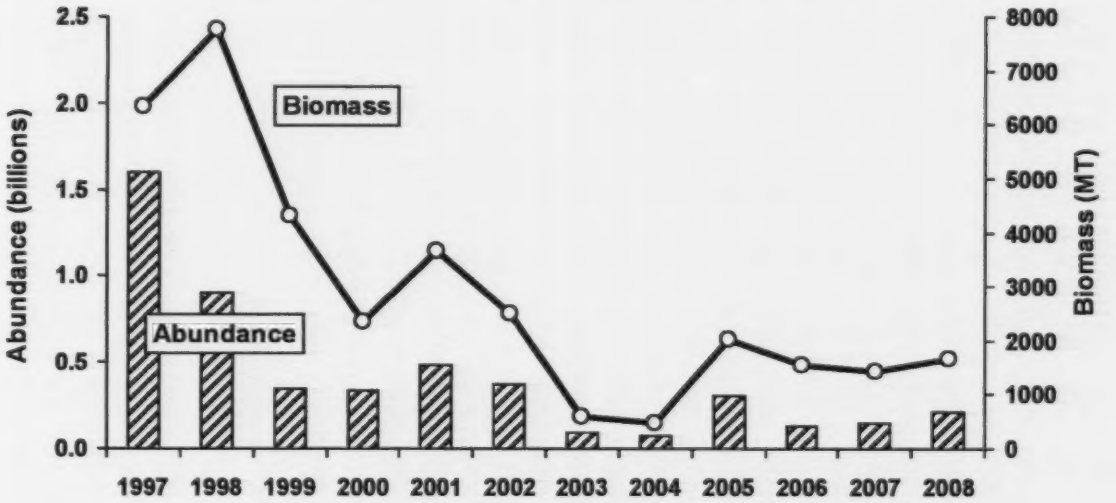

FIG. 2.6.2. Abundance and biomass of yearling-and-older **rainbow smelt**. Abundance estimates were obtained directly from hydroacoustic surveys, biomass estimates were obtained by applying average weights to abundance estimates. The weight information normally comes from midwater trawls done during the surveys, however information from other sources was used for years 2002, 2004, 2005, and 2008.

2.7 Nearshore Community Index Netting

The provincial standard nearshore community index netting program (NSCIN) was adopted to sample the nearshore fish community beginning during 2001. The program provides comparable samples collected in Areas of Concern and reference locations. This program was initiated on the upper Bay of Quinte (Trenton to Deseronto) in 2001, and was expanded to include the lower Bay of Quinte (Deseronto to Lake Ontario) in 2002. Both upper and lower Bay of Quinte were sampled from 2002-2005. In 2006, the NSCIN program was conducted on Hamilton Harbour and the Toronto waterfront area thanks to partnerships developed with the Department of Fisheries and Oceans Canada and the Toronto Region Conservation Authority. In 2007, NSCIN was conducted in five areas: Lake St. Francis (St. Lawrence River), the upper Bay of Quinte, East and West Lakes (two Lake Ontario embayments on the southwest side of Prince Edward County, and the Toronto waterfront area. In 2008, NSCIN was conducted in five areas: Lake St. Francis (St. Lawrence River), the upper Bay of Quinte, Weller's Bay, Presq'ile Bay, and Hamilton Harbour.

The NSCIN program utilized 6-foot trapnets and was designed to evaluate the abundance and other biological attributes of fish species that inhabit the littoral area. Suitable trapnet sites were chosen from randomly selected UTM grids that contained shoreline in the area netted.

Lake St. Francis

The 2008 Lake St. Francis NSCIN project was, as in 2007, conducted in partnership with the Raisin Region Conservation Authority, at Cornwall. Thirty-six trapnet sites were sampled from Aug 18-Sep 5 with water temperatures ranging from 21.0-24.1 °C (Table 2.7.1). Nearly 3,400 fish comprising 16 species were captured (Table 2.7.2). The most abundant species by number were brown bullhead (1,279), pumpkinseed (907), rock bass (472), yellow perch (220), white sucker (142) and black crappie (118). Of note, eight silver lamprey and seven American eel were caught.

TABLE 2.7.1. Survey information for the 2008 NSCIN trapnet program on Lake St. Francis, upper Bay of Quinte, Weller's Bay, Presq'ile Bay and Hamilton Harbour.

	Lake St. Francis	Upper Bay of Quinte	Weller's Bay	Presqu'ile Bay	Hamilton Harbour
Survey dates	Aug 18-Sep 5	Sep 8-26	Sep 16-26	Sep 30-Oct 2	Aug 11-22
Water temperature (°C)	21.0-24.1 °C	17.4-21.4 °C	17.1-20.0 °C	14.9-16.7 °C	20.1-22.9 °C
No. of trapnet lifts	36	36	24	12	24
No. sites by depth (m):					
Target (2-2.5 m)	6	12	7	6	8
>Target (max)	1	17	3	0	3
<Target (min)	28	7	14	6	13
No. sites by substrate:					
Hard	7	28	10	0	5
Soft	29	8	14	12	19
No. sites by cover:					
None	1	7	3	0	1
1-25%	6	15	19	4	16
25-75%	13	13	2	7	7
>75%	16	1	0	1	0

Bay of Quinte

Thirty-six trapnet sites were sampled on the upper Bay of Quinte from Sep 8-26 with water temperatures ranging from 17.4-21.4 °C (Table 2.7.1). Nearly 8,400 fish comprising 18 species were captured (Table 2.7.2). The most abundant species by number were bluegill (5,728), pumpkinseed (653), black crappie (624), yellow perch (252), brown bullhead (231), largemouth bass (194) and white perch (155). Four species of redhorse were caught silver (18), shorthead (12), greater (3), and river redhorse (16) a species of special concern (see Section 7.3).

Weller's Bay

Twenty-four trapnet sites were sampled from Sep 16-26 with water temperatures ranging from 17.1-20.0 °C (Table 2.7.1). Nearly 2,400 fish comprising 14 species were captured (Table 2.7.2). The most abundant species by number were bluegill (835), rock bass (156), pumpkinseed (78), brown bullhead (63), largemouth bass (53) and smallmouth bass (48).

Presq'ile Bay

Twelve trapnet sites were sampled from Sep 30-Oct 2 with water temperatures ranging from 14.9-16.7 °C (Table 2.7.1). Over 700 fish comprising 14 species were captured (Table 2.7.2). The most abundant species by number were brown bullhead (332), bluegill (147), pumpkinseed (63), rock bass (56) and largemouth bass (50).

Hamilton Harbour

The Hamilton Harbour NSCIN project was conducted in partnership with the Department of Fisheries and Oceans at Burlington. Twenty-four trapnet sites were sampled from Aug 11-22 with water temperatures ranging from 20.1-22.9 °C (Table 2.7.1). Over 6,200 fish comprising 17 species were captured (Table 2.7.2). The most abundant species by number were brown bullhead (4,544), white perch (837), channel catfish (382) and common carp (94). Of note was the capture of a single muskellunge, several large northern pike

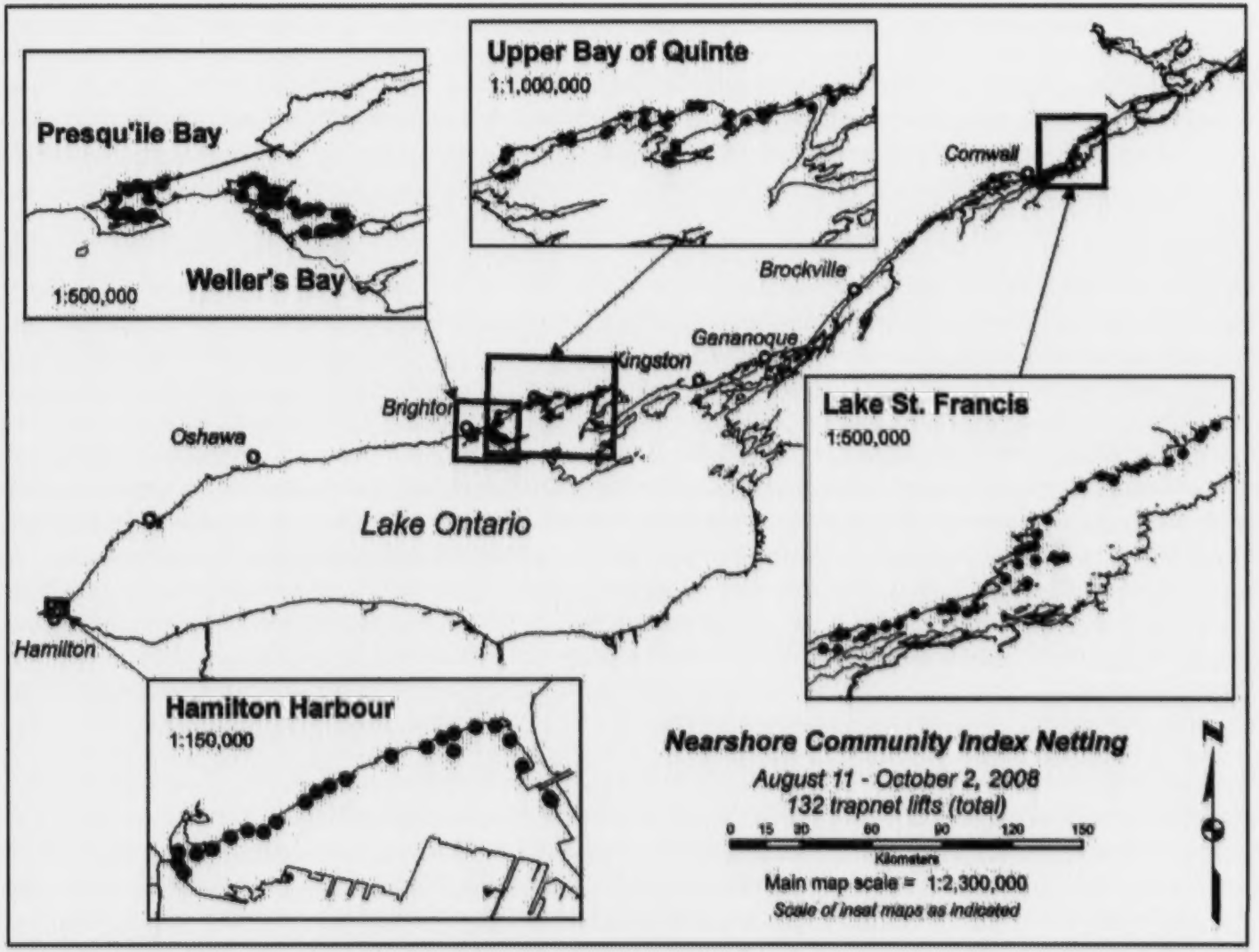

TABLE 2.7.1. Map of Lake Ontario and the St. Lawrence River indicating NSCIN trapnet locations (2008) in each of five areas: Lake St. Francis, the upper Bay of Quinte, Weller's Bay, Presq'ile Bay, and Hamilton Harbour.

TABLE 2.7.2. Species-specific catch in the 2008 NSCIN trapnet program on Lake St. Francis, the upper Bay of Quinte, Weller's Bay, Presq'ile Bay and Hamilton Harbour. Statistics shown arithmetic and geometric mean catch-per-trapnet (CUE), percent relative standard error of mean log10(catch+1), %RSE = 100*SE/mean, and mean fork or total length (mm). A total of 30 species (plus one unidentified minnow) were caught.

	Lake St. Francis				Upper Bay of Quinte				Weller's Bay				Presq'ile Bay				Hamilton Harbour			
	Arithmetic mean CUE	Geometric mean CUE	RSE (%)	Mean length (mm)	Arithmetic mean CUE	Geometric mean CUE	RSE (%)	Mean length (mm)	Arithmetic mean CUE	Geometric mean CUE	RSE (%)	Mean length (mm)	Arithmetic mean CUE	Geometric mean CUE	RSE (%)	Mean length (mm)	Arithmetic mean CUE	Geometric mean CUE	RSE (%)	Mean length (mm)
Silver lamprey	0.222	0.144	40	165																
Longnose gar	0.778	0.328	37	732	0.361	0.224	34	740	1.542	0.806	25	832	0.333	0.230	54	610	0.708	0.476	27	773
Bowfin					1.111	0.545	27	568	0.583	0.421	26	541	1.083	0.603	41	474	1.167	0.760	23	541
Gizzard shad	0.028	0.019	100	380	1.000	0.304	43	149					0.917	0.533	42	248	0.500	0.358	29	323
Rainbow trout																	0.042	0.029	100	200
Northern pike	0.611	0.435	21	662	0.333	0.201	37	567	0.500	0.341	31	544	0.667	0.513	32	596	1.083	0.576	31	699
Muskellunge																	0.042	0.029	100	1180
Quillback																	0.042	0.029	100	480
White sucker	3.944	2.267	12	391	0.917	0.671	17	416	0.625	0.410	30	417	0.250	0.189	52	417	0.208	0.142	48	242
Silver redhorse	1.278	0.599	26	530	0.500	0.241	39	469					0.083	0.059	100	590	0.042	0.029	100	390
Shorthead redhorse	0.028	0.019	100	470	0.333	0.180	42	393									0.042	0.029	100	450
Greater redhorse					0.083	0.051	72	540												
River redhorse					0.444	0.212	44	502												
Minnow (unidentified)																	0.042	0.029	100	530
Goldfish																	0.917	0.556	28	343
Common carp	0.722	0.367	32	639	0.222	0.126	49	663	0.417	0.281	35	657	0.250	0.161	69	763	3.917	2.201	17	524
Golden shiner	0.028	0.019	100		0.222	0.139	43	150					0.167	0.096	100	130				
Brown bullhead	35.528	12.160	10	254	6.417	2.516	16	268	2.625	1.497	20	253	27.667	9.759	18	237	189.333	46.406	10	290
Channel catfish					0.806	0.460	25	612									15.917	6.444	13	475
American eel	0.194	0.135	39	921																
White perch	0.028	0.019	100	150	4.306	1.559	21	201	0.292	0.142	62	271	0.167	0.096	100	190	34.875	14.772	11	174
White bass					0.139	0.092	49	236	0.042	0.029	100	290					1.750	0.759	31	295
Rock bass	13.111	5.668	11	145	3.972	1.472	19	179	6.500	4.212	11	172	4.667	2.841	20	161	1.083	0.650	26	178
Pumpkinseed	25.194	7.461	13	154	18.139	6.503	11	145	3.250	2.139	15	166	5.250	3.438	18	121	1.125	0.535	34	126
Bluegill	0.833	0.462	27	157	159.111	37.574	9	142	34.792	16.232	11	157	12.250	6.085	19	135	3.208	1.311	25	152
Smallmouth bass	1.111	0.587	23	354	0.917	0.337	36	224	2.000	0.944	26	379								
Largemouth bass	0.472	0.307	28	270	5.389	2.808	14	231	2.208	1.136	23	268	4.167	1.533	33	236	0.167	0.122	47	323
Black crappie	3.278	1.364	20	234	17.333	4.723	14	222	0.208	0.142	48	260	0.250	0.161	69	197	0.167	0.091	73	213
Yellow perch	6.111	2.673	14	188	7.000	3.734	12	197	0.083	0.047	100	225	1.417	0.815	34	184	0.625	0.263	51	192
Walleye	0.556	0.326	30	501	2.500	1.027	23	447	1.833	1.205	19	373	0.583	0.381	45	281	0.167	0.122	47	658
Freshwater drum	0.278	0.167	41	584	1.167	0.660	23	458					0.333	0.189	72	485	1.708	0.789	29	407
Total CUE	94				233				58				61				259			
Number of species	16				18				14				14				17			
Number of nets	36				36				24				12				24			
Total catch	3,396				8,378				1,380				726				6,213			

and a small rainbow trout.

Status of Selected Species

Northern pike

Northern pike were most abundant in Hamilton Harbour and least abundant in the upper Bay of Quinte (Table 2.7.2).

American eel

Seven American eel were caught in Lake St. Francis but none was caught in the other areas (Table 2.7.2).

Pumpkinseed

Pumpkinseed were most abundant in Lake St. Francis and the upper Bay of Quinte and least abundant in Hamilton Harbour (Table 2.7.2).

Bluegill

Bluegill were most abundant in the upper Bay of Quinte and least abundant in Lake St. Francis (Table 2.7.2).

Smallmouth bass

Smallmouth bass were present moderate abundance levels in Weller's Bay, Lake St. Francis and the upper Bay of Quinte but absent from the Presq'ile Bay and Hamilton Harbour catches (Table 2.7.2).

Largemouth bass

Largemouth bass were most abundant in the upper Bay of Quinte and Presq'ile Bay areas, present at moderate levels in Weller's Bay and at relatively low levels in Lake St. Francis and Hamilton Harbour (Table 2.7.2).

Black crappie

Black crappie were most abundant in the upper Bay of Quinte, and Lake St. Francis, and uncommon in the other areas (Table 2.7.2).

Yellow perch

Yellow perch were most abundant in the upper Bay of Quinte and Lake St. Francis, moderately abundant in Presq'ile Bay and uncommon in Weller's Bay and Hamilton Harbour (Table 2.7.2).

Walleye

Walleye were most abundant in the upper Bay of Quinte and Weller's Bay. Walleye were less common in Lake St. Francis and Presq'ile Bay, and rare in Hamilton Harbour (Table 2.7.2). The majority of walleye caught across the waterbodies were young--from age-1 to age-5 years. A few older fish were caught in all areas except Presq'ile Bay. The most common age was age-5 (2003 year-class) followed closely by age-3 fish (2005 year-class) (Table 2.7.3). Length-at-age was similar and high in all areas except Weller's Bay where length-at-age was significantly lower.

TABLE 2.7.2. Species-specific catch in the 2008 NSCIN trapnet program on Lake St. Francis, the upper Bay of Quinte, Weller's Bay, Presq'ile Bay and Hamilton Harbour. Statistics shown arithmetic and geometric mean catch-per-trapnet (CUE), percent relative standard error of mean log10(catch+1), %RSE = 100*SE/ mean, and mean fork or total length (mm). A total of 30 species (plus one unidentified minnow) were caught.

	Age																
Age (years)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Year-class	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997	1996	1995	1994	1993	1992	1991
Lake St. Francis																	
Number	1	1	7	1	2				1	1							1
Mean fork length (mm)	290	355	428	520	490				611	644							646
Mean weight (g)	251	477	907	1588	1381				2567	2831							2996
Upper Bay of Quinte																	
Number	3	3	11	3	12		2										
Mean fork length (mm)	276	384	435	495	515		580										
Mean weight (g)	221	638	950	1299	1541		2216										
Weller's Bay																	
Number	2	8	6	3	11				2	1							
Mean fork length (mm)	218	304	350	419	419				538	566							
Mean weight (g)	108	291	469	805	816				1545	1952							
Presq'ile Bay																	
Number	7																
Mean fork length (mm)	276																
Mean weight (g)	232																
Hamilton Harbour																	
Number									2	2							
Mean fork length (mm)									660	616							
Mean weight (g)									4304	3344							

2.8 St. Lawrence River Fish Community Index Netting—Lake St. Francis

Every other year in early fall, the Lake Ontario Management Unit conducts an index gillnet survey in Lake St. Francis. The catches are used to estimate abundance, measure biological attributes, as well as to collect ageing structures, stomach contents and tissues for pathological examination for selected species. This survey is part of a larger effort to monitor changes in the fish communities in four distinct sections of the St. Lawrence River (Thousand Islands, Middle Corridor, Lake St. Lawrence, and Lake St. Francis), and it is coordinated with the New York State Department of Environmental Conservation (NYSDEC) to provide river-wide coverage of fisheries resources.

In 2008, the survey was conducted during the period of September 11-28. Thirty six sets were made, using standard multi-panel gillnets with monofilament meshes ranging from 1.5-6 in. The nets were fished for approximately 24 hours. The overall catch was 1,755 fish comprising 14 species (summary in Table 2.8.1). The average number of fish per set was 48.9 which is the highest since the survey series began in 1984, and more than three times the low levels observed in 2002 (Fig. 2.8.1). The dominant species in the catch were yellow perch, rock bass, brown bullhead, common white sucker and smallmouth bass (Fig. 2.8.2).

Species Highlights

Yellow perch rebounded in 2008. Previously, there has been a dramatic decline in the abundance of yellow perch between the start of the series in 1984 and 2002 (Fig.2.8.3). The decline was especially evident in large perch (>220mm) indicating increased mortality of older fish. The trend, however, was reversed in 2006, when large number of small perch was caught, and in 2008 the catches of both small and large perch were the highest since the start of the survey series in 1984.

Northern pike remained relatively stable through the period of 1984-1992 (Fig.2.8.4). A decline in abundance of small fish (<500mm) was observed in 1994, followed by a sharp decline in abundance of all sizes in 2002. This pattern is the opposite of the one observed in yellow perch, and it suggests a recruitment

TABLE 2.8.1. Summary of catches per standard gillnet set in Lake St. Francis surveys 1984-2008. All catches prior to 2001 have been adjusted by a factor of 1.58 to be comparable to the new netting standard initiated in 2002. No survey was conducted in 1996.

	1984	1986	1988	1990	1992	1994	1998	2000	2002	2004	2006	2008
Lake sturgeon	-	-	-	-	-	-	-	0.04	-	0.03	-	0.03
Longnose gar	-	0.23	0.09	-	0.66	0.26	0.14	0.13	0.40	-	0.06	-
Bowfin	0.04	-	-	-	-	-	-	-	-	-	-	-
Alewife	0.04	-	-	-	-	-	-	-	0.03	0.06	0.22	-
Salvelinus sp.	-	-	0.04	-	-	-	-	-	-		-	-
Northern pike	4.18	3.93	4.44	3.82	4.13	3.91	3.71	3.34	1.23	1.45	1.67	1.08
Muskellunge	-	-	0.04	-	-	-	-	-	-	0.03	-	-
White sucker	1.71	2.17	1.01	1.71	1.41	1.67	1.99	1.63	0.74	1.06	0.97	1.94
Moxostoma sp.	-	-	0.04	0.18	0.04	0.09	0.18	0.09	-	-	0.11	0.19
Common carp	0.13	-	-	0.09	-	-	-	-	0.09	-	0.25	0.03
Golden shiner	-	-	-	-	-	0.04	-	-	0.03	-	-	-
Creek chub	-	-	-	-	-	-	0.09	-	-	-	-	-
Fallfish	-	-	-	0.09	-	-	-	-	-	-	-	-
Brown bullhead	1.14	1.27	0.62	0.40	0.70	0.44	0.95	3.25	0.54	1.38	2.81	1.97
Rock bass	3.52	3.48	2.81	1.36	2.15	2.11	2.58	1.85	2.26	2.17	5.69	7.89
Pumpkinseed	4.97	1.72	0.84	0.75	1.49	1.76	1.54	1.06	0.41	0.41	0.89	1.50
Bluegill	-	-	-	-	-	-	0.05	0.04	0.10	-	-	-
Smallmouth bass	0.88	0.63	0.26	0.26	0.62	0.62	1.40	0.44	1.02	0.59	1.17	1.67
Largemouth bass	0.04	-	0.09	0.09	-	0.04	0.09	0.13	0.20	-	0.61	0.31
Black crappie	0.04	0.09	0.04	0.04	0.09	0.13	-	0.09	0.07	-	-	-
Yellow perch	21.45	16.32	20.88	16.57	15.83	13.72	11.89	9.36	6.49	7.45	16.36	31.03
Walleye	0.48	0.45	0.97	0.35	0.35	0.26	0.36	0.31	0.16	0.41	0.39	1.08
Freshwater drum	-	-	-	-	-	-	-	-	0.04	-	-	0.03
All species	38.64	30.30	32.18	25.72	27.48	25.06	24.96	21.76	13.81	15.04	31.19	48.89
Count of species	13	10	14	13	11	13	13	14	16	11	14	13

problem. The levels over the past four surveys (eight years) have remained low, and given that the abundance of small pike declined more than ten-fold since the mid 1990s, further decreases in abundance of large pike can be expected.

Smallmouth bass have increased in abundance in recent years – the average catches in the 1998-2008 period were almost twice as high as those in 1984-1994 (Fig. 2.8.5), and the catches in 2008 were the highest since the start of the survey series in 1984.

Walleye were caught in low and relatively stable numbers in the past, but in 2008 the catches of walleye increased to more than double the average numbers seen since the start of the survey series.

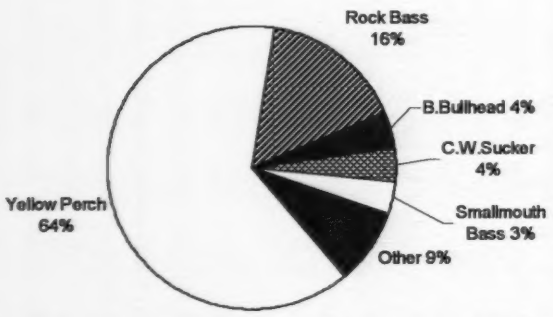

FIG. 2.8.1. Species composition in the 2008 survey in Lake St. Francis.

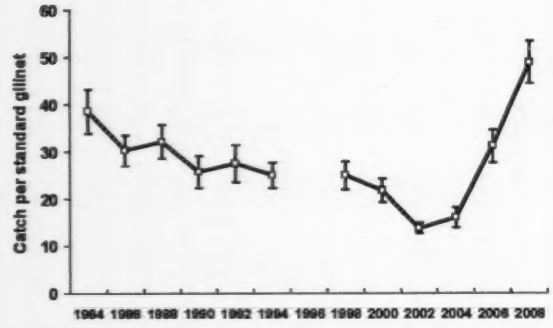

FIG. 2.8.2. Catches (± 1 SE) of all species combined, Lake St. Francis, 1984-2008.

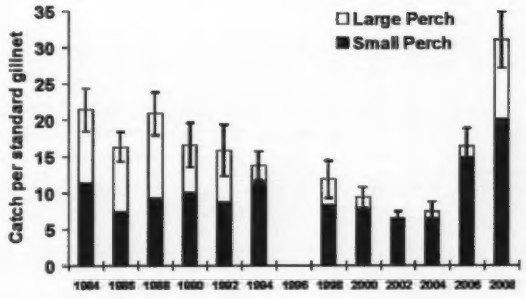

FIG. 2.8.3. Catches of yellow perch, Lake St. Francis, 1984-2008. Error bars (± 1SE) apply to the total catch (small + large).

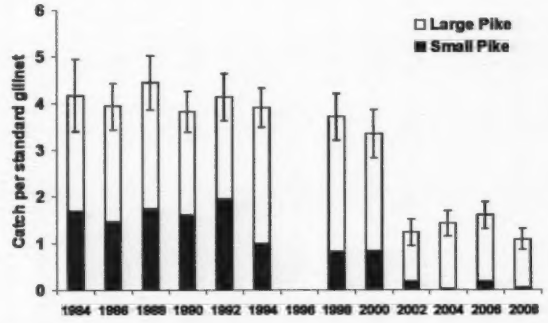

FIG. 2.8.4. Catches of northern pike, Lake St. Francis, 1984-2008. Error bars (± 1SE) apply to the total catch (small + large).

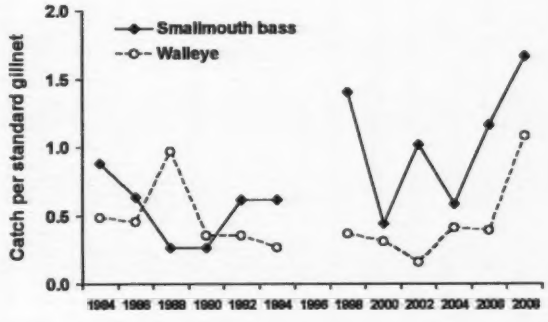

FIG. 2.8.5. Catches of smallmouth bass and walleye, Lake St. Francis, 1984-2008.

2.9 Juvenile Atlantic Salmon Electrofishing

Atlantic salmon were stocked in Cobourg Creek, Duffins Creek, and the Credit River to restore self-sustaining populations. To evaluate the success of this program we electrofished sites on these streams to determine the survival various life stages. Electrofishing for juvenile Atlantic salmon was conducted in October after most of the year's growth was complete, and when fish size indicates potential smolting. On Cobourg Creek and Duffins Creek one electrofishing pass was conducted moving upstream with a block net at the upper end of the site to reduce escapement of fish. The abundance (N) of young-of-the-year (YOY) salmonids was estimated for each species at each site using: N = catch+catch /(1/(1-0.2617x(mean weight)$^{0.27116}$)-1). For yearlings and older salmonids the abundance was estimated according to Jones and Stockwell (1995)[1]. On the Credit River salmonid abundance was estimated using mark-recapture with one day between marking and recapture sessions.

At Cobourg Creek a more intense survey was conducted as part of our partnership with Trent University, Ontario Federation of Anglers and Hunters, and Aquatic Research and Development Section of OMNR to study Atlantic salmon survival to smoltation. A total of 18 randomly selected sites were electrofished on Cobourg Creek and its tributary,

TABLE 2.9.1. Mean catch and standard deviation (SD) of species of fish in Cobourg Creek and Duffins Creek during first electrofishing pass during surveys in 2008. Catch by site (DU21 - DU25) is shown for Duffins Creek. Ganatsekiagon Creek is a tributary of Duffins Creek.

		Cobourg Cr.		Duffins Cr.						Ganatsekiagon Cr.
Species	Group	Mean	SD	DU21	DU22	DU23	DU24	Mean	SD	DU25
Unknown Lamprey		4.9	11.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sea Lamprey		0.2	0.5	0.0	0.0	6.0	0.0	1.5	3.0	0.0
Chinook Salmon	Age 0	0.1	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Adult	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rainbow Trout	Age 0	22.8	22.5	0.0	0.0	0.0	0.0	0.0	0.0	2.0
	Age 1+	6.9	4.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Atlantic Salmon	Age 0	-	-	35.0	25.0	20.0	8.0	22.0	11.2	0.0
	Age 1+	-	-	3.0	5.0	11.0	15.0	8.5	5.5	0.0
	Age 0+	21.9	46.8	-	-	-	-	-	-	-
Brown Trout	Age 0	4.1	5.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Age 1+	3.3	4.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Brook Trout	Age 0	0.0	0.0	3.0	1.0	1.0	0.0	1.3	1.3	0.0
	Age 1+	0.1	0.2	3.0	4.0	3.0	3.0	3.3	0.5	0.0
White Sucker		3.4	4.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fathead Minnow		0.6	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Blacknose Dace		20.4	24.1	0.0	0.0	12.0	5.0	4.3	5.7	12.0
Longnose Dace		33.6	48.1	16.0	13.0	14.0	116.0	39.8	50.9	3.0
Creek Chub		0.8	1.4	0.0	0.0	6.0	0.0	1.5	3.0	3.0
Pumpkinseed		0.2	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rainbow Darter		0.0	0.0	4.0	0.0	2.0	9.0	3.8	3.9	1.0
Fantail Darter		0.3	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Johnny Darter		3.3	8.6	0.0	0.0	0.0	0.0	0.0	0.0	3.0
Round Goby		0.2	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mottled Sculpin		28.0	24.8	0.0	0.0	0.0	0.0	0.0	0.0	12.0

Baltimore Creek. All of these sites were sampled in 2007. Another 6 sites sampled in 2007 on the northwest tributary of Baltimore Creek were not sampled in 2008. Data from each site on Cobourg Creek are not presented here as they are part of a graduate study and will be published later, after the thesis is complete. Sites on Cobourg Creek were located from the mouth up to Baltimore Creek, and in Baltimore Creek up to Ball's Mill. Sampling included locations where Atlantic salmon were and were not stocked. Atlantic salmon tended to dominate at the sites where they were stocked. Across all Cobourg Creek sites, Atlantic salmon were the fourth most abundant species caught, in similar abundance with longnose dace, mottled sculpin, rainbow trout, and blacknose dace (Table 2.9.1).

At Duffins Creek five randomly selected sites were electrofished at locations where Atlantic salmon were stocked. Three of these sites (DU21 - DU23) were sampled in 2007. Atlantic salmon were the most abundant species caught at DU21 - DU23 (Table 2.9.1), followed by longnose dace. No Atlantic salmon were observed at Ganatsekiagon Creek (DU25), perhaps due to the wash-out of a beaver dam about 100 m upstream of the site. Across the other four sites on Duffins Creek we observed an inverse relationship between Age-0 and Age-1 Atlantic salmon. Future work might establish the downstream distribution and survival of age-1 and older Atlantic salmon.

At the Credit River we sampled one site (top: 44.8033°N, 79.9940°W) immediately downstream from the Forks of the Credit. The dimensions of this site were 290 m long X 16.2 m wide. On October 22 and October 24, 2008, the site was electrofished from bottom to top using 2 backpack electrofishers. On the first day, all captured salmonids were marked with a whole punch in the caudal fin, and then released within the site. On the second day all captured salmonids were examined for marks. Other species were released upon capture, and were not recorded. The fork length of all salmonids was measured to the nearest 5mm. Individual weights were obtained from length-weight regressions based on fish from Cobourg and Duffins Creeks. Population estimates of Atlantic salmon and brown trout were based on the modified Petersen method, and was stratified by fish length to reduce bias associated with size related electrofishing catchability (Table 2.9.2). Population estimates for rainbow trout and brook trout were based on the combined catchability of all salmonids <140 mm. Atlantic salmon were the most abundant salmonid at this site (1,354), followed by brown trout (232), rainbow trout (17), and brook trout (4). The length distribution suggested that 66 Atlantic salmon >150 mm were likely yearlings. Similarly 57 brown trout >140 mm were likely yearlings and older.

1 Jones, M.L. and J.D. Stockwell. 1995. A rapid assessment procedure for the numeration of salmonine populations in streams. N. Amer. J. Fish. Man. 15:551-562.

TABLE 2.9.2. Estimated abundance (N), density (No./m and No./m^2) and biomass (g/m^2) by species of Atlantic salmon and brook trout in the Credit River during electrofishing surveys in 2008.

Species	Fork length (mm)	Mean weight (g)	Catch day 1	Catch day 2	Recap	N	95% CI	Catchability	No./m	No./m^2	Biomass (g/m^2)
Atlantic salmon	<105	8.9	123	163	30	655	463-923	0.184	2.26	0.139	1.25
	>105	19.8	206	212	62	699	547-892	0.292	2.41	0.149	2.95
	Total		329	375	92	1,354			4.67	0.288	4.2
	>150	46				66			0.23	0.014	0.65
Brown trout	<140	11.6	22	45	5	175	82-338	0.111	0.6	0.037	0.43
	>140	309.6	16	16	4	57	25-113	0.25	0.2	0.012	3.74
	Total		38	61	9	232			0.8	0.049	4.17
Rainbow trout	<118	12.7	5	3	0	17		0.235	0.06	0.004	0.05
Brook trout	118	16.6	0	1	0	4		0.235	0.01	0.001	0.02

2.10 Credit River Chinook Assessment

Growth, condition and lamprey marking of Chinook salmon were monitored during the fall spawning run in the Credit River at the Reid Milling dam in Streetsville. Chinook salmon were electrofished in the Credit River for spawn collection by the Ringwood Fish Culture Station. LOMU crews measured the fork length, weighed, and collected otoliths from Chinook salmon for ageing. The body condition was estimated for each sex as the weight of a 900 mm fish based on a general linear model.

Condition (mean weight of a 900 mm fish) of male and female Chinook salmon in the Credit River in 2008 compared was not significantly different from 2007 and 2006, and remained among the lowest observed since 1989 (Fig. 2.10.1).

In 2008, sea lamprey marks on Chinook salmon in the Credit River declined to very low levels (Fig. 2.10.2), similar to the early 1990s.

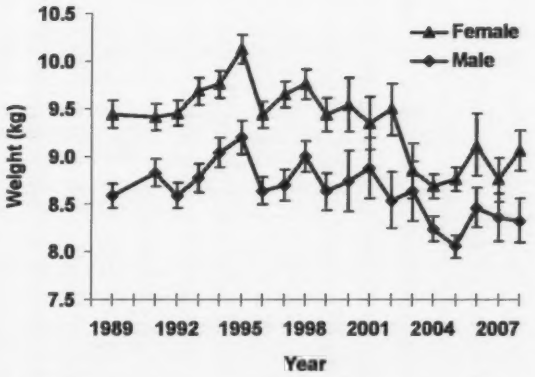

FIG. 2.10.1. Mean weight (+ 95%) of a 900 mm Chinook salmon in the Credit River, 1989-2008, during the spawning run (approximately October 1).

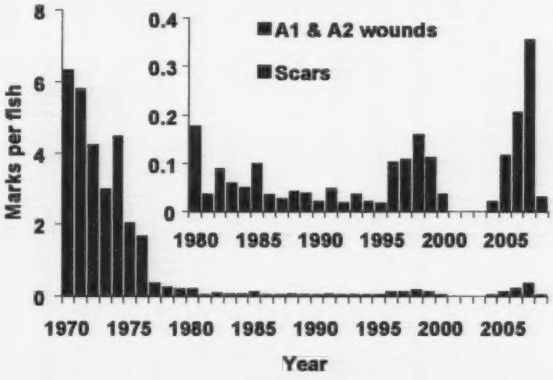

FIG. 2.10.2. Lamprey marking on Chinook salmon and coho salmon during fall, 1970-2008, in the Credit River, Ontario. Since 1990, A1 and A2 marks[1] were called wounds and the remainder of marks were called scars to fit with historical classification.

[1] King, E. L., Jr. and T. A. Edsall. 1979. Illustrated field guide for the classification of sea lamprey attack marks on great lakes lake trout. G.L.F.C. Special Publication 79-1.

3. Recreational Fishing Surveys

3.1 Bay of Quinte Recreational Fishery

Only the open-water fishing component of the Bay of Quinte recreational angling fishery was monitored; the ice-fishery was not surveyed during the winter of 2008. The 2008 open-water survey was conducted from Trenton to just east of Glenora. Angling effort was measured using on-water boat counts. Boat angler interviews provide information on catch/harvest rates and biological characteristics of the harvest.

Open-water fishery

Over 1,900 anglers were interviewed by field crews during the survey. Twenty-nine percent of anglers interviewed were local, 55% were from Ontario (outside the local area), 8% were from the US, and less than 8% were from elsewhere in Canada. Angling effort was targeted primarily at walleye (96%). Fishing effort was estimated to be 209,153 angler hours for all anglers and 201,669 hours for anglers targeting walleye (Table 3.1.1). Numbers of walleye caught and harvested were 38,253 and 24,954 respectively. About 35% of angling effort and 40% of walleye catch/harvest occurred during May. Having declined during the late 1990s, angling effort, catch and harvest values in 2008 were similar to values observed after 2000.

Numbers of walleye caught and harvested per hour by anglers targeting walleye were 0.187 and 0.124 respectively; somewhat low relative to recent years (Tables 3.1.1 and 3.1.2). Over 40% of harvested walleye were age-3 (Fig. 3.1.1) from the 2005 year-class.

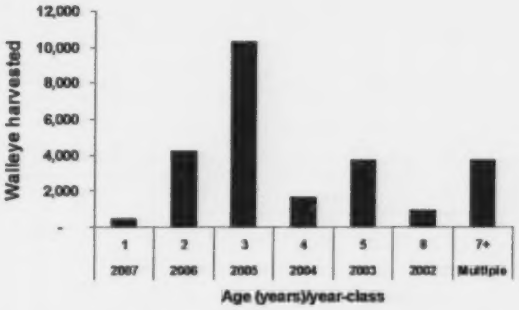

FIG. 3.1.1. Age distribution of walleye harvested during the open-water angling fishery in the Bay of Quinte, 2008.

TABLE 3.1.1. Summary creel survey statistics for the 2008 Bay of Quinte open-water angling fishery. [1]July and August were not surveyed but estimated using the seasonal pattern of angling effort and fishing success rates observed in previous years. Fall represents September-November inclusive. The statistics are reported for both all anglers and for anglers specifically targeting walleye. Effort is reported as angler hours.

	Season						
	Opening weekend	Rest of May	June	July[1]	August[1]	Fall	Total
Catch (all anglers)	3,236	11,305	7,809	6,749	4,682	4,472	38,253
Catch (targeted)	3,236	11,305	7,809	6,479	4,407	4,472	37,708
Harvest (all anglers)	2,531	7,346	5,351	4,071	3,569	2,086	24,954
Harvest (targeted)	2,531	7,346	5,351	4,072	3,543	2,086	24,929
Effort (all anglers)	25,387	47,744	20,898	23,943	29,958	61,223	209,153
Effort (hrs; targeted)	25,330	46,848	20,898	21,591	26,446	60,557	201,669
CUE (all anglers)	0.127	0.237	0.374	0.282	0.156	0.073	0.183
CUE (targeted)	0.128	0.241	0.374	0.300	0.167	0.074	0.187
HUE (all anlgers)	0.100	0.154	0.256	0.170	0.119	0.034	0.119
HUE (targeted)	0.100	0.157	0.256	0.189	0.134	0.034	0.124

TABLE 3.1.2. Summary of fishing effort (expressed in angler hours separately for all anglers and those targeting walleye), numbers of walleye caught and harvested, and walleye angling success (CUE and HUE are the numbers of walleye caught and harvested, respectively, per hour by anglers targeting walleye) during the Bay of Quinte open-water recreational fishery (first Saturday in May, opening day of walleye season, to November 30), 1993-2008. In 2008, May-June and September-November were surveyed, while July and August statistics were estimated based on the seasonal pattern observed in prior years.

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Fishing Effort (angler hours):																
Total All Anglers	644,477	693,731	519,276	665,436	544,476	481,553	379,012	309,259	247,537	177,092	219,684	241,700	225,385	180,907		209,153
Anglers Targeting Walleye	637,401	689,543	512,054	660,005	539,276	475,678	374,128	296,841	222,052	154,570	194,168	203,082	205,933	161,190		201,669
Walleye caught	266,638	262,760	166,229	209,280	134,651	70,527	47,562	28,024	40,734	29,459	70,471	39,251	42,213	59,966		38,253
Walleye harvested	145,383	145,642	98,537	117,931	82,790	52,844	33,575	22,811	28,078	17,903	34,905	24,277	25,757	36,329		24,954
Walleye Angling Success																
CUE	0.417	0.378	0.320	0.317	0.250	0.148	0.127	0.094	0.182	0.186	0.344	0.193	0.204	0.372		0.187
HUE	0.227	0.209	0.189	0.179	0.154	0.111	0.090	0.077	0.126	0.113	0.178	0.119	0.125	0.225		0.124

4. Commercial Fishery

4.1 Quota and Harvest Summary

Lake Ontario supports a locally important commercial fish industry. The commercial harvest comes primarily from the Canadian waters of Lake Ontario east of Brighton (including the Bay of Quinte) and the St. Lawrence River (Fig. 4.1.1). Commercial harvest statistics for 2008 were obtained from the commercial fish harvest information system (CFHIS) which is managed, in partnership, by the the Ontario Commercial Fisheries Association (OCFA) and the Ontario Ministry of Natural Resources. Commercial quota, harvest and landed value statistics for Lake Ontario and the St. Lawrence River for 2008 are shown in Tables 4.1.1 (base quota), 4.1.2 (issued quota), 4.1.3 (harvest) and 4.1.4 (landed value).

FIG. 4.1.1. Map of Lake Ontario and the St. Lawrence River showing commercial fishing quota zones in Canadian waters.

Lake Ontario

The total harvest of all species was 373,926 lb ($294,331) in 2008, down 69,774 lb (16%) from 2007 (Fig. 4.1.2, Table 4.1.5).

Lake whitefish
Lake whitefish harvest was 68,072 lb, 57% of base quota, and a doubling of the previous year's harvest. Seasonal whitefish harvest and biological attributes (e.g., size and age structure) information are reported in Section 4.2.

Yellow perch
Yellow perch harvest was 112,591lb, 25% of the base quota, and a decrease of 82,531 lb (42%) from the previous year.

Walleye
Walleye harvest was 19,288 lb, 36% of the base quota, and an increase of 4,291 lb (29%) from the previous

TABLE 4.1.1. Commercial fish base quota (lb) in the Canadian waters of Lake Ontario, 2008. See Fig. 1 for a map of the quota zones. Although there is also American eel base quota, commercial fishing for this species is currently closed, due to conservation considerations, and base quotas are not shown here.

	Lake Ontario					St. Lawrence River			East Lake	West Lake	Base quota by waterbody (lb)		
	1-1	1-2	1-3	1-4	1-8	1-5	2-5	1-7	1	1	Lake Ontario	St. Lawrence River	Total
Alewife							600						600
Black crappie	4,540	2,500	14,810	800	2,800	14,170	18,365	6,490	3,100	9,850	25,450	12,950	77,425
Bowfin					500						500	-	500
Brown bullhead	36,200								14,350	27,220	36,200	41,570	77,770
Common carp			1,000								1,000	-	1,000
Lake whitefish	7,273	76,016	15,860	20,308	208						119,664	-	119,664
Sunfish	28,130								14,600	18,080	28,130	32,680	60,810
Walleye	4,510	37,120		10,717	800						53,147	-	53,147
Yellow perch	35,589	182,508	96,128	126,170	13,000	68,996	83,174	5,760	1,400	4,420	453,395	5,820	617,145
Total	116,242	298,144	127,798	157,995	17,308	83,166	102,139	12,250	33,450	59,570	717,486	93,020	1,008,061

TABLE 4.1.2. Commercial fish issued quota (lb) in the Canadian waters of Lake Ontario, 2008. See Fig. 1 for a map of the quota zones.

	Lake Ontario					St. Lawrence River			East Lake	West Lake	Issued quota by waterbody (lb)		
	1-1	1-2	1-3	1-4	1-8	1-5	2-5	1-7	1	1	Lake Ontario	St. Lawrence River	Total
Alewife							300				-	300	300
Black crappie	2,270	1,250	24,685	400	1,400	7,785	9,548	2,420	1,550	4,925	30,005	19,753	56,233
Bowfin					250						250	-	250
Brown bullhead	18,100								7,175	13,610	18,100	-	38,885
Common carp			500								500	-	500
Lake whitefish	7,275	121,595	19,637	18,141	208						166,856	-	166,856
Sunfish	14,065								15,100	19,040	14,065	-	48,205
Walleye	1,256	23,044		12,983	400						37,683	-	37,683
Yellow perch	19,176	112,878	87,766	111,684	6,500	62,206	41,587	5,760	700	2,210	338,004	109,553	450,467
Total	62,142	258,767	132,588	143,208	8,758	69,991	51,435	8,180	24,525	39,785	605,463	129,606	799,379

TABLE 4.1.3. 2008 commercial harvest (lb) for fish species harvested from the Canadian waters of Lake Ontario and the St. Lawrence River, East lake and West Lakes (two Lake Ontario embayments).

	Lake Ontario					St. Lawrence River			East Lake	West Lake	Total harvest (lb)		
Species	1-1	1-2	1-3	1-4	1-8	1-5	2-5	1-7	1	1	Lake Ontario	St. Lawrence River	All waterbodies
Black crappie	13	0	15,587	9	10	3,283	884	749	11	460	15,618	4,916	21,005
Bowfin	1,547	7	2,568	19	0	2,043	989	215	348	13	4,141	3,247	7,749
Brown bullhead	4,301	550	26,276	1,431	10	8,977	5,015	34,255	154	957	32,567	48,247	81,924
Burbot	0	5	0	0	0	0	0	0	0	0	5	0	5
Channel catfish	0	0	0	0	4	0	0	0	0	0	4	0	4
Common carp	81	1,204	1,784	990	0	154	0	0	187	0	4,060	154	4,400
Freshwater drum	32	2,562	14,495	6,345	0	27	0	0	21	4	23,434	27	23,486
Lake herring	0	222	2,247	869	0	0	0	0	0	0	3,337	0	3,337
Lake whitefish	120	61,154	5,143	1,655	0	0	0	0	0	0	68,072	0	68,072
Northern pike	2,535	1,563	9,912	1,520	12	6,187	0	0	1,799	235	15,542	6,187	23,762
Rock bass	467	3,047	5,703	1,745	0	1,253	250	0	1,614	1,011	10,961	1,503	15,089
Suckers	123	748	3,039	862	0	1,707	0	5,082	0	203	4,772	6,788	11,763
Sunfish	326	17	37,463	76	5	3,055	5,066	9,955	9,546	11,325	37,886	18,076	76,832
Walleye	894	9,211	0	9,182	1	0	0	0	0	0	19,288	0	19,288
White bass	0	41	0	359	5	0	0	0	0	0	405	0	405
White perch	1	209	12,870	8,151	12	720	0	0	39	1,252	21,243	720	23,253
Yellow perch	1,016	26,633	45,315	39,621	6	40,686	13,324	5,090	130	86	112,591	59,099	171,906
Total	11,454	107,172	182,402	72,834	63	68,091	25,527	55,345	13,849	15,545	373,926	148,963	552,282

TABLE 4.1.4. 2008 commercial harvest (lb), price per lb, and landed value for fish species harvested from the Canadian waters of Lake Ontario and the St. Lawrence River, and the total for all waterbodies including East lake and West Lakes.

	Lake Ontario			St. Lawrence River			All waterbodies		
Species	Harvest	Price per lb	Landed value	Harvest	Price per lb	Landed value	Harvest	Price per lb	Landed value
Black crappie	15,618	$2.73	$42,637	4,916	$ 2.51	$12,360	21,005	$ 2.68	$56,259
Bowfin	4,141	$0.37	$1,520	3,247	$ 0.53	$1,715	7,749	$ 0.44	$3,393
Brown bullhead	32,567	$0.30	$9,802	48,247	$ 0.32	$15,472	81,924	$ 0.31	$25,621
Common carp	4,060	$0.11	$444	154	$ 0.09	$13	4,400	$ 0.11	$477
Freshwater drum	23,434	$0.09	$2,015	27	$ 0.07	$2	23,486	$ 0.09	$2,019
Lake herring	3,337	$0.30	$1,006	0	$ -	$0	3,337	$ 0.30	$1,006
Lake whitefish	68,072	$0.82	$56,020	0	$ -	$0	68,072	$ 0.82	$56,020
Northern pike	15,542	$0.26	$4,106	6,187	$ 0.29	$1,794	23,762	$ 0.27	$6,453
Rock bass	10,961	$0.47	$5,157	1,503	$ 0.28	$428	15,089	$ 0.45	$6,760
Suckers	4,772	$0.10	$481	6,788	$ 0.14	$978	11,763	$ 0.13	$1,485
Sunfish	37,886	$0.82	$30,975	18,076	$ 0.73	$13,164	76,832	$ 0.79	$60,601
Walleye	19,288	$1.89	$36,519	0	$ -	$0	19,288	$ 1.89	$36,519
White bass	405	$0.51	$208	0	$ -	$0	405	$ 0.51	$208
White perch	21,243	$0.33	$7,106	720	$ 0.28	$203	23,253	$ 0.33	$7,738
Yellow perch	112,591	$0.86	$96,336	59,099	$ 0.74	$43,825	171,906	$ 0.82	$140,337
Total	373,917		$294,331	148,963		$89,954	552,273		$404,895

TABLE 4.1.5. Commercial harvest (lb; 1960-2008) and landed value ($; 1985-2008) trends for the Canadian waters of Lake Ontario, including the Bay of Quinte.

	Harvest (lb)		Harvest (lb)	Value ($)
1960	1,834,000			
1961	2,026,000	1985	1,497,000	$ 906,879
1962	1,620,000	1986	1,759,000	$ 1,577,086
1963	1,847,000	1987	756,000	$ 993,609
1964	1,814,000	1988	1,190,000	$ 896,481
1965	2,226,000	1989	1,211,000	$ 989,563
1966	1,347,000	1990	1,165,000	$ 907,409
1967	1,617,000	1991	1,210,000	$ 1,003,909
1968	1,829,000	1992	1,191,000	$ 1,039,892
1969	2,130,000	1993	1,103,000	$ 746,892
1970	2,798,000	1994	1,243,097	$ 1,277,262
1971	2,804,000	1995	1,218,508	$ 1,322,557
1972	2,455,000	1996	1,284,022	$ 1,456,736
1973	2,279,000	1997	1,078,250	$ 996,383
1974	2,299,000	1998	973,006	$ 1,059,212
1975	2,664,000	1999	964,743	$ 1,067,904
1976	2,935,000	2000	914,014	$ 990,544
1977	2,456,000	2001	840,557	$ 861,978
1978	2,469,000	2002	602,338	$ 475,262
1979	2,042,000	2003	447,633	$ 324,320
1980	1,982,000	2004	404,236	$ 249,444
1981	2,387,000	2005	395,365	$ 310,084
1982	1,999,000	2006	579,738	$ 521,910
1983	2,263,000	2007	443,691	$ 429,171
1984	2,050,000	2008	373,917	$ 294,331

TABLE 4.1.6. Commercial harvest (lb; 1988-2008) and landed value ($; 1989-1994 and 1996-2008) trends for the Canadian waters of the St. Lawrence River.

	Harvest (lb)	Value ($)
1988	318,000	
1989	273,800	$ 217,000
1990	305,100	$ 237,000
1991	247,600	$ 328,100
1992	292,700	$ 257,300
1993	237,000	$ 171,900
1994	262,240	$ 257,900
1995	375,763	
1996	445,052	$ 399,856
1997	353,838	$ 397,494
1998	378,729	$ 424,111
1999	368,035	$ 438,581
2000	341,672	$ 407,647
2001	272,523	$ 352,551
2002	266,817	$ 241,817
2003	211,254	$ 203,710
2004	143,845	$ 102,646
2005	221,294	$ 206,479
2006	230,201	$ 190,819
2007	175,951	$ 161,484
2008	148,963	$ 89,954

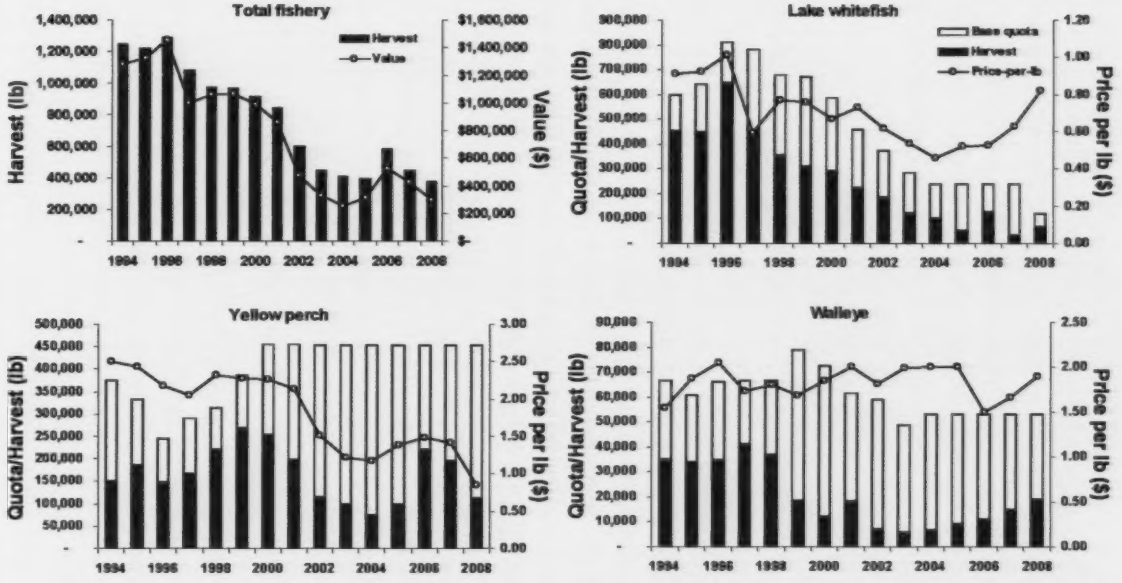

FIG. 4.1.2. Total harvest and value for the Lake Ontario commercial fishery and quota, harvest and price-per-lb for lake whitefish, yellow perch and walleye, 1994-2008.

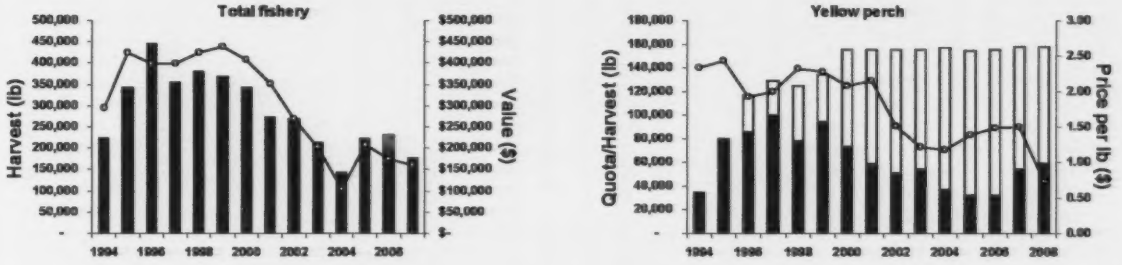

FIG. 4.1.3. Total harvest and value for the St. Lawrence River commercial fishery and quota, harvest and price-per-lb for yellow perch, 1994-2008.

year.

St. Lawrence River

The total harvest of all species was 148,963 lb ($89,954) in 2008 (Fig. 4.1.3, Table 4.1.6).

Yellow perch

Yellow perch harvest was 59,099 lb, 37% of base quota, an increase of 5,135 lb (10%) from the previous year.

4.2 Lake Whitefish Commercial Catch Sampling

Sampling of commercially harvested lake whitefish for biological attribute information occurs annually. While total lake whitefish harvest can be determined from commercial fish Daily Catch Reports (DCRs; see section 4.1), biological sampling of the catch is necessary to break-down total harvest into size and age-specific harvest. Age-specific harvest data can then be used in catch-age modeling to estimate population size and mortality schedule.

An experimental spring (Mar 25-Jun 30) gillnet fishery occurred in QZ 1-2. This fishery was monitored by an OCFA observer especially to evaluate lake trout bycatch.

Commercial lake whitefish harvest and fishing effort by gear type, month and quota zone (QZ) for 2008 is reported in Table 4.2.1. Most of the harvest was taken in gillnets (90% by weight); 10% of the harvest was taken in impoundment gear. Gillnet fishing during November in QZ 1-2 accounted for 59% of the total harvest, for this gear type, and 29% of the effort). Significant harvest and effort also occurred in this QZ during the spring experimental gillnet fishery. Most impoundment gear harvest and effort occurred in October and November in QZ 1-3 (Table 4.2.1).

Biological sampling focused on the experimental spring gillnet fishery, the November spawning-time gillnet fishery on the south shore of Prince Edward County (QZ 1-2), and the October/November spawning-time impoundment gear fishery in the Bay of Quinte (QZ 1-3). The lake whitefish sampling design involves obtaining large numbers of length tally measurements and a smaller length-stratified sub-sample for more detailed biological sampling. Whitefish length and age distribution information is presented in (Fig. 4.2.1 and Fig. 4.2.2). In total, fork length was measured for 1,606 fish and age was interpreted using otoliths for 322 fish (Table 4.2.2, Fig. 4.2.1 and 4.2.2).

Lake Ontario Gillnet Fishery (QZ 1-2)

The mean fork length and age of lake whitefish harvested during the gillnet fishery in Quota Zone 1-2 were 498 and 13.7 years respectively (Fig. 4.2.1).

Bay of Quinte November Impoundment Gear Fishery (QZ 1-3)

Mean fork length and age were 465 mm and 10.1 years, respectively (Fig. 4.2.2). Fish ranged from ages 5 to 21 years. This represents the first year since 1994 that the 1991 year-class was not the most abundant year-class in the Quota Zone 1-3

TABLE 4.2.1. Lake whitefish harvest (lb) and fishing effort (yards of gillnet or number of impoundment nets) by gear type, month and quota zone. Harvest and effort value in bold italic represent months and quota zones where whitefish biological samples were collected.

		Harvest (lb)					Effort (yards or number of nets)			
Gear type	Month	1-1	1-2	1-3	1-4	Month	1-1	1-2	1-3	1-4
Gillnet	Jan	-	-	-	-	Jan	-	-	-	-
	Feb	-	-	-	7	Feb	-	-	-	40
	Mar	-	***643***	-	158	Mar	-	***9,000***	-	2,046
	Apr	-	***6,403***	-		Apr	-	***37,200***	-	-
	May	-	***7,400***	-		May	-	***33,900***	-	-
	Jun	-	***1,727***	-		Jun	-	***17,000***	-	-
	Jul	-	2,827	-		Jul	-	9,140	-	-
	Aug	-	569	-		Aug	-	3,600	-	-
	Sep	-	2,765	-	900	Sep	-	6,600	-	5,800
	Oct	-	693	-	148	Oct	-	5,880	-	800
	Nov	-	***36,225***	-	214	Nov	-	***56,000***	-	1,952
	Dec	-	144	-	146	Dec	-	1,200	-	840
Impoundment	Apr			24		Apr			48	
	May		977	29	38	May		14	73	4
	Jun		582		37	Jun		15		2
	Oct		70	1,179		Oct		3	231	
	Nov	120	59	***3,409***		Nov	12	1	***347***	

TABLE 4.2.2. Age-specific vital statistics of lake whitefish sampled and harvested including number aged, number lengthed[1] (determined by age-length key), and proportion by number of fish sampled, harvest by weight (kg) and number, and mean weight (kg) and fork length (mm) of the harvest for Quota Zone 1-3. No biological sample was available for Quota Zone 1-2.

Quota zone 1-2								Quota zone 1-3							
	Sampled		Harvested						Sampled		Harvested				
Age (years)	Number aged	Number lengthed[1]	Prop.	Number	Weight (kg)	Mean weight (kg)	Mean length (mm)	Age (years)	Number aged	Number lengthed[1]	Prop.	Number	Weight (kg)	Mean weight (kg)	Mean length (mm)
1	-	-	0.000	-	-			1	-	-	0.000	-	-		
2	-	-	0.000	-	-			2	-	-	0.000	-	-		
3	-	-	0.000	-	-			3	-	-	0.000	-	-		
4	2	4	0.004	80	59	0.730	415	4	-	-	0.000	-	-		
5	4	21	0.024	447	424	0.949	446	5	15	75	0.103	73	66	0.904	433
6	8	33	0.038	710	678	0.955	440	6	22	131	0.180	131	124	0.940	434
7	7	34	0.039	734	737	1.004	450	7	9	54	0.074	52	52	0.996	444
8	2	10	0.012	216	229	1.060	456	8	9	67	0.093	67	59	0.876	430
9	9	50	0.057	1,078	1,193	1.107	458	9	7	39	0.053	38	45	1.196	470
10	6	43	0.049	929	1,143	1.230	477	10	16	87	0.120	88	101	1.144	467
11	4	23	0.026	485	687	1.416	494	11	10	40	0.055	41	54	1.318	492
12	2	15	0.017	313	433	1.381	487	12	7	19	0.026	19	29	1.504	509
13	16	103	0.117	2,195	3,209	1.462	506	13	8	39	0.053	39	51	1.303	486
14	16	98	0.112	2,098	3,157	1.505	510	14	16	52	0.071	52	80	1.542	510
15	18	116	0.132	2,480	3,542	1.429	509	15	9	27	0.037	27	41	1.521	511
16	20	124	0.141	2,650	4,433	1.673	528	16	4	11	0.015	10	18	1.788	533
17	20	104	0.118	2,214	3,683	1.663	518	17	16	43	0.060	44	78	1.800	534
18	9	42	0.047	888	1,508	1.698	532	18	4	13	0.018	13	25	1.865	531
19	8	32	0.036	684	1,372	2.005	554	19	6	21	0.029	21	38	1.795	525
20	5	17	0.020	374	794	2.123	554	20	4	9	0.012	10	18	1.911	560
21	3	9	0.010	183	371	2.028	562	21	1	1	0.002	1	2	1.900	
22	1	2	0.002	33	90	2.706	580	22	-	-	0.000	-	-	1.990	543
Total	160	879	1.000	18,792	27,739			Total	162	727	1.000	1,928	2,333		
Weighted mean						1.476		Weighted mean						1.210	

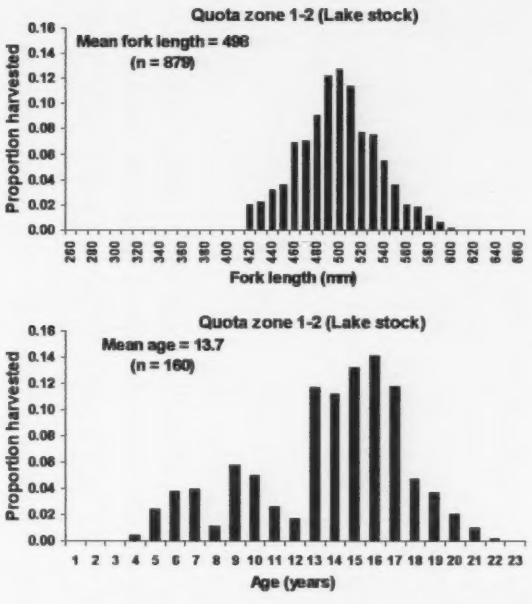

FIG. 4.2.1. Size and age distribution (by number) of lake whitefish sampled in QZ 1-2 during the 2008 commercial catch sampling program.

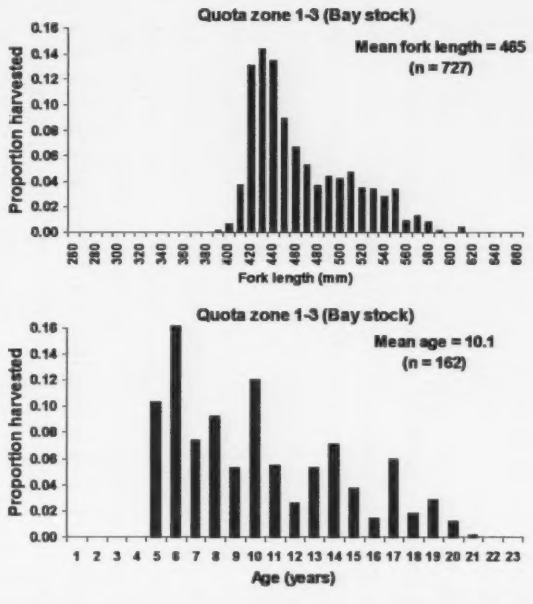

FIG. 4.2.2. Size and age distribution (by number) of lake whitefish sampled in QZ 1-3 during the 2008 commercial catch sampling program.

commercial harvest.

Condition

Lake whitefish (Lake Ontario and Bay of Quinte spawning stocks and sexes combined) condition (lb) standardized for a fish of total length 21 inches (480 mm fork length) is shown in Figure 4.2.3. Condition declined markedly in 1994 and has remained low.

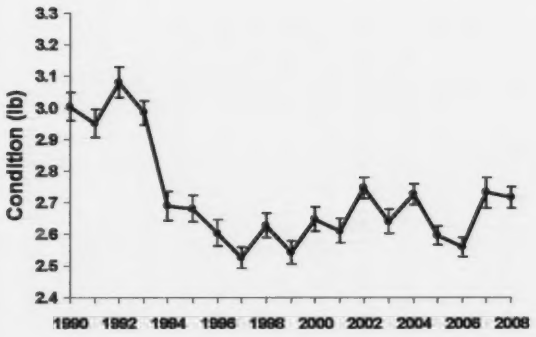

FIG. 4.2.3. Lake whitefish (Lake Ontario and Bay of Quinte spawning stocks and sexes combined) condition (lb) standardized for a fish of total length 21 inches (480 mm fork length), 1990-2008.

Experimental Spring Fishery

The OCFA observer accompanied fishers on 30 days of experimental spring gillnet in QZ 1-2 for lake whitefish. Estimated lake trout bycatch statistics are summarized in Table 4.2.3. Estimates for Mar-Jun (**bold**) are based on observations while those from the other months were based on DCR reports. Overall an estimated 2,461 lake trout were caught of which about one-half were caught during the spring experimental gillnet fishery.

4.3 Northern Pike Commercial Catch Sampling

Commercial catch sampling of northern pike was undertaken for the first time in the spring of 2008. An OCFA observer conducted the sampling with the primary objective of determining some basin biological characteristics of the harvest. Pike have been commercially harvest, on an experimental basis since part way through the 2006 fishing season. In 2008, the OCFA observer focused on sampling pike from the April hoop net fishery in several quota zones; harvest in this component of the pike fishery had been the largest the previous year (2007). The 2008 harvest in summarized in Table 4.3.1.

The observer conducted sampling on 12 days from Apr 17-May 19, 2009. Of 1,026 pike observed, 496 were harvested and 515 were released; all released fish were less than 3 lb (Table 4.3.2). Seventy three percent of the harvested fish were female, and the mean weight of harvested pike was 2.6 lb (Table 4.3.3). Ninety two percent of the pike sampled were in post-spawn condition; the remained were pre-spawn or in spawning condition.

TABLE. 4.2.3. Lake whitefish harvest and lake trout catch statistics for the QZ 1-2 lake whitefish gillnet fishery in 2008. Values in bold are based on observer data while other values are based on DCR data.

	Estimated harvest statisitcs												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Number of observer days	0	0	**4**	**12**	**10**	**4**	0	0	0	0	0	0	30
Whitefish harvest (#)	-	-	**201**	**2,001**	**2,312**	**540**	883	178	864	217	11,320	45	18,561
Whitefish harvest (lb)	-	-	**643**	**6,403**	**7,400**	**1,727**	2,827	569	2,765	693	36,225	144	59,396
Gillnet effort (yd)	-	-	**9,000**	**37,200**	**33,900**	**17,000**	9,140	3,600	6,600	5,880	56,000	1,200	179,520
Whitefish HUE (#/yd)			**0.0287**	**0.0619**	**0.0731**	**0.0463**	0.1044	0.0549	0.1241	0.0365	0.2064	0.0375	
Whitefish HUE (lb/yd)			**0.0920**	**0.1914**	**0.2340**	**0.1195**	0.3103	0.1757	0.3971	0.1168	0.6638	0.1201	
Lake trout released (#)	-	-	**193**	**121**	**599**	**96**	205	48	59	59	370	-	1,751
Lake trout released (lb)	-	-	**1,282**	**806**	**3,986**	**636**	1,366	322	391	394	2,461	-	11,645
Lake trout discarded (#)	-	-	**14**	**53**	**146**	**74**	5	-	-	41	332	-	665
Lake trout discarded (lb)	-	-	**91**	**355**	**969**	**495**	32	-	-	275	2,208	-	4,425
Lake trout total (#)	-	-	**206**	**174**	**745**	**170**	199	45	55	107	759	-	2,461
Lake trout total (lb)	-	-	**1,373**	**1,160**	**4,956**	**1,131**	1,321	302	367	711	5,052	-	16,372
Lake trout CUE (#/yd)			**0.0229**	**0.0047**	**0.0220**	**0.0100**	0.0217	0.0126	0.0084	0.0182	0.0136	0.0000	
Lake trout as % of whitefish harvest (#)			**103%**	**9%**	**32%**	**31%**	22%	26%	6%	49%	7%		13%
Lake trout as % of whitefish harvest (lb)			**214%**	**18%**	**67%**	**65%**	47%	53%	13%	103%	14%		28%

TABLE 4.3.1. Northern pike harvest by gear-type (gillnet and impoundment), month, and quota zone in 2008. No pike harvest was permitted in QZ 2-5 or QZ 1-7.

		Lake Ontario					St. Lawrence R.	East L.	West L.	Total
Gear-type	Month	1-1	1-2	1-3	1-4	1-8	1-5	1	1	
Gillnet	Feb				15					15
	Mar				183					183
	Apr		156		191					347
	May		281		63					344
	Jun		47							47
	Jul		63							63
	Aug		16							16
	Sep		111		110					221
	Oct		9		146					155
	Nov		264		131					395
	Dec				74					74
Impoundment	Jan	11		284						295
	Feb	116								116
	Mar			77			105			183
	Apr	1,384		4,104	87		5,339	1,112	78	12,103
	May	278	108	803	146		732	805	65	2,937
	Jun	42	435	166	98		11	70		821
	Jul	129	60		51					240
	Aug		14		187				7	207
	Sep	100		1,969	32				30	2,131
	Oct	208		1,363	8				55	1,634
	Nov	244		1,146		12				1,401
	Dec	24								24
Total		2,534	1,563	9,912	1,520	12	6,187	1,986	235	23,949

TABLE 4.3.2. Number of northern pike observed during the 2008 catch sampling program by category and including the number of biological samples collected, the percent female and mean weight of sampled pike.

		Number of pike observed
Caught		1,026
Harvested		496
Released:	< 3 lb	515
	> 3 lb	-
Biological samples		181
% female		73%
Average weight (lb)		2.6

TABLE 4.3.3. Mean weight by sex and quota zone of northern pike sampled during the 2008 catch sampling program.

	Sex			
Quota zone	Male	Female	Unknown	Total
East Lake	1.7 (24)	2.2 (76)		2.1 (100)
1-3	2.2 (16)	2.9 (28)	2.1 (1)	2.6 (45)
1-5	2.3 (8)	4.6 (28)		4.1 (36)
Total	1.9 (48)	2.9 (132)	2.1 (1)	2.6 (181)

5. Age & Growth Summary

Biological sampling of fish from Lake Ontario Management Unit field projects routinely involves collection and archival of structures used for such purposes as age interpretation and validation, origin determination (e.g. stocked versus wild), life history characteristics and other features of fish growth. In 2008, a total of 9,873 structures were collected and 3,276 were processed for age interpretation from 32 different fish species and 17 different field projects (Table 5.1).

TABLE 5.1. Species-specific summary of age and growth structures collected/archived (n = 9,873) and interpreted for age (3,276) in support of 17 different Lake Ontario Management Unit field projects, 2008.

	Scales		Otoliths		Cleithra		Opercula		Spines	
Species	Collected / archived	Interpreted for age	Collected / archived	Interpreted for age	Collected / archived	Interpreted for age	Collected / archived	Interpreted for age	Collected / archived	Interpreted for age
Alewife	-	-	119	-	-	-	-	-	-	-
Gizzard shad	25	-	-	-	-	-	-	-	-	-
Coho salmon	4	-	4	-	-	-	-	-	-	-
Chinook salmon	152	-	210	186	-	-	-	-	-	-
Rainbow trout	349	171	66	-	-	-	-	-	-	-
Atlantic salmon	118	-	4	-	-	-	-	-	-	-
Brown trout	90	-	85	-	-	-	-	-	-	-
Lake trout	313	-	309	246	-	-	-	-	-	-
Lake whitefish	426	-	427	409	-	-	-	-	-	-
Cisco (Lake herring)	59	-	59	-	-	-	-	-	-	-
Round whitefish	23	-	23	-	-	-	-	-	-	-
Rainbow smelt	-	-	85	-	-	-	-	-	-	-
Northern pike	308	-	-	-	306	306	-	-	-	-
Muskellunge	1	-	-	-	-	-	-	-	-	-
White sucker	2	-	-	-	-	-	1	-	-	-
Brown bullhead	-	-	-	-	-	-	-	-	76	-
American eel	-	-	289	-	-	-	-	-	-	-
Burbot	-	-	1	-	-	-	-	-	-	-
White perch	403	-	-	-	-	-	-	-	-	-
White bass	18	-	-	-	-	-	-	-	-	-
Rock bass	255	-	-	-	-	-	-	-	-	-
Pumpkinseed	259	198	-	-	-	-	-	-	-	-
Bluegill	224	205	-	-	-	-	-	-	-	-
Smallmouth bass	182	170	2	-	-	-	-	-	-	-
Largemouth bass	197	122	10	-	-	-	11	-	-	-
Black crappie	76	71	-	-	-	-	-	-	-	-
Yellow perch	1,664	630	550	-	-	-	-	-	-	-
Walleye	805	179	619	383	-	-	-	-	-	-
Round goby	-	-	6	-	-	-	-	-	-	-
Freshwater drum	291	-	323	-	-	-	-	-	-	-
Slimy sculpin	-	-	42	-	-	-	-	-	-	-
Deepwater sculpin	-	-	2	-	-	-	-	-	-	-
Total	6,244	1,746	3,235	1,224	306	306	12	-	76	-

6. Contaminant Monitoring

Lake Ontario Management Unit cooperates annually with several agencies to collect fish samples for contaminant testing. In 2008, 702 contaminant samples were collected for Ontario's Ministry of the Environment Sport Fish Monitoring program (Table 6.1.). Samples were primarily collected using existing fisheries assessment programs on Lake Ontario, Bay of Quinte and the St. Lawrence River.

A summary of the number of fish samples collected, by species, for contaminant analysis by the Ministry of Environment, 2001-2008 is shown in Table 6.2.

TABLE 6.1. Number of fish samples collected, by region and species, for contaminant analysis by the Ministry of Environment, 2008.

Region	Block	Species	Total
Northwestern Lake Ontario	6	Chinook salmon	19
		Lake trout	20
		Rainbow trout	1
Ganaraska River	7	Rainbow trout	20
Northeastern Lake Ontario	8	Bluegill	19
		Brown bullhead	20
		Brown trout	20
		Chinook salmon	17
		Lake trout	6
		Walleye	5
Upper Bay of Quinte	9	Bluegill	80
		Brown bullhead	48
		Pumpkinseed	58
Middle Bay of Quinte	10	Bluegill	3
		Freshwater drum	20
		Largemouth bass	6
		Northern pike	9
		Pumpkinseed	14
		Smallmouth bass	4
		Walleye	16
		White perch	20
		Yellow perch	20
Lower Bay of Quinte/Eastern Lake Ontario	11	Brown trout	9
		Freshwater drum	12
		Lake trout	20
		Northern pike	6
		Rock bass	20
		Smallmouth bass	15
		Walleye	20
		White perch	15
		Yellow perch	20
Lake St. Francis	15	Largemouth bass	20
		Northern pike	20
		Pumpkinseed	20
		Smallmouth bass	20
		Walleye	20
		Yellow perch	20
Total			702

TABLE 6.2. Summary of the number of fish samples collected, by species, for contaminant analysis by the Ministry of Environment, 2001-2008.

	Year								
Species	2000	2001	2002	2003	2004	2005	2006	2007	2008
Black crappie			20	20	3	20		20	
Bluegill		26		20	10	23			102
Brown bullhead		40	44	40	25	30	33	40	68
Brown trout	40	3	20		31		22	6	29
Channel catfish	20	20	7	23		17			
Chinook salmon	40	3	16		48		29	1	36
Coho salmon		1	3						
Common carp				7					
Freshwater drum			43		16		13	2	32
Lake trout			42		54		38	17	46
Lake whitefish	20								
Largemouth bass		4	25	28	20	9	8	89	26
Northern pike		53	39	60	22	40	22	94	35
Pumpkinseed		60	25	57	8	11	23	78	92
Rainbow trout	40	37	28	20	37	20	29	20	21
Rock bass		36	30	38	11	21	27	30	20
Silver redhorse							1		
Smallmouth bass		20	87	22	21	28	35	23	39
Walleye		42	51	40	61	30	62	98	61
White perch		40		40	40	14	21	20	35
White sucker							1		
Yellow perch	20	60	66	58	75	40	86	90	60
Total	180	445	546	473	482	303	450	628	702

7. Management Activities

7.1 Stocking

OMNR is committed to providing diverse fisheries (and the associated benefits) in Lake Ontario and its tributaries, based on wild and stocked fish, as appropriate. OMNR is also committed to restoration of native species and supports efforts to maintain / restore healthy, stable Lake Ontario fish communities.

During 2008, OMNR stocked about 1.7 million salmon and trout into Lake Ontario (Table 7.1.1). Figure 7.1.1 shows salmon and trout stocking trends in Ontario waters from 1968-2008. The New York State Department of Environmental Conservation (NYSDEC) also stocked 2.6 million salmon and trout into the lake in 2008.

Over 525,000 Chinook salmon spring fingerlings were stocked at various locations to provide put-grow-and-take fishing opportunities. Of these, about 25,000 were held in pens at three sites in Lake Ontario for a short period of time prior to stocking. This ongoing project is being done in partnership with local community groups. It is hoped that pen-imprinting will help improve returns of mature adults to these areas in the fall, thereby enhancing local nearshore and shore fishing opportunities. All Chinook salmon stocked in 2008 were marked with a coded wire tag and/or an adipose fin clip. This was done using Northwest Marine Technology's AutoFish, a unique, highly automated clipping and tagging system. Marking will help us determine levels of natural reproduction of Chinook salmon in Lake Ontario. The study is being done cooperatively between New York and Ontario. Anglers will begin to see marked fish in the fishery in 2009.

TABLE 7.1.1. American eel, salmon and trout stocked into Province of Ontario waters of Lake Ontario, 2008, and target for 2009.

		Number Stocked	
Species		**2008**	**2009 target**
American eel		**2,322,671**	**3,000,000**
Atlantic salmon	Eggs	24,775	10,000
	Fry	188,024	537,500
	Fall fingerlings	61,798	229,250
	Spring yearlings	11,579	75,000
	Sub-adults	921	0
		287,097	**851,750**
Brown trout	Spring yearlings	**177,133**	**165,000**
Chinook salmon	Spring fingerlings	**527,035**	**540,000**
Coho salmon	Fall fingerlings	**79,808**	**50,000**
Lake trout	Spring yearlings	**444,322**	**440,000**
Rainbow trout	Fall fingerlings	17,636	
	Spring yearlings	154,437	140,000
		172,073	**140,000**
Stocking totals		**4,010,139**	**5,186,750**

Atlantic salmon were stocked in support of an ongoing program to restore self-sustaining populations of this native species to the Lake Ontario basin (see Section 7.3). Almost 300,000 Atlantic salmon of various life stages were released into current restoration streams: Credit River, Duffins Creek and Cobourg Brook. Fish losses as a result of power interruptions at OMNR's Normandale Fish Culture Station in 2007 and 2008 significantly affected fry and fall fingerling and spring yearling stocking rates in 2008. OMNR is working cooperatively with a network of partners to plan and deliver this phase of Atlantic salmon restoration, including setting new stocking targets to help meet program objectives. Atlantic salmon are produced at both OMNR and partner facilities. The Atlantic salmon broodstock is currently housed at OMNR's Harwood Fish Culture Station.

Over 440,000 lake trout yearlings were also stocked as part of an established, long-term rehabilitation program. Lake trout stocking is focused in eastern Lake Ontario where most of the historic spawning shoals are found.

Rainbow trout and brown trout were stocked at various locations to provide shore and boat fishing opportunities. A portion of the rainbow trout target is stocked into streams with a potential to establish wild populations. About 80,000 coho fall fingerlings were produced and stocked by a partner hatchery, operated by the Ontario Federation of Anglers and Hunters and supported by volunteers from the Metro East Anglers Association.

Over 2.3 million young American eel were stocked into the upper St. Lawrence River and eastern Lake Ontario in an effort to restore the greatly suppressed stock. These glass-eel juveniles were collected on the Atlantic coast and transported to Lake Ontario and the St. Lawrence River above the dams they face during their migration. This is part of the Ontario Power Generation Eel Action Plan and contributes to a broad,

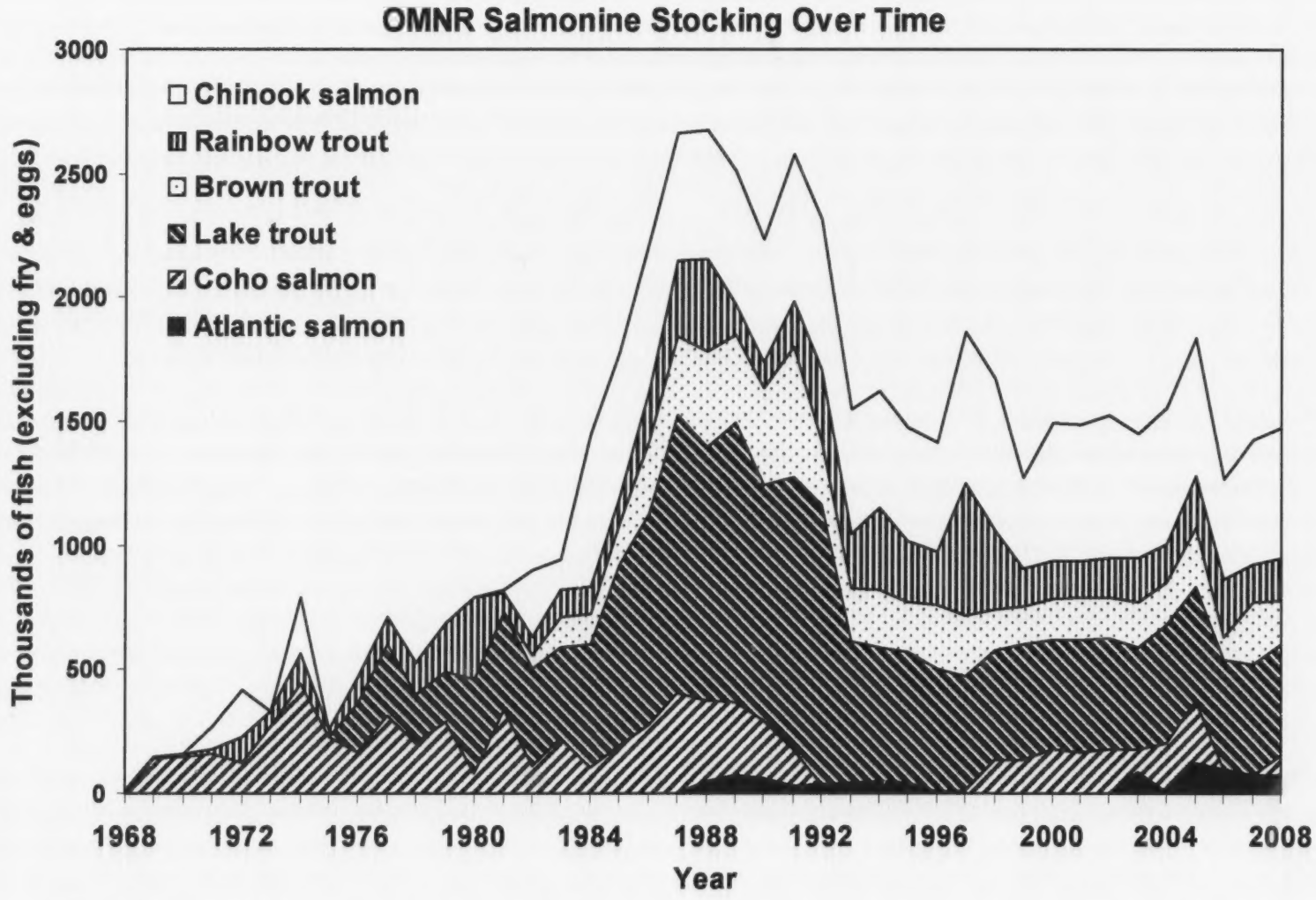

FIG. 7.1.1. Trends in salmon and trout stocking in Ontario waters of Lake Ontario, 1968-2008.

bi-national, multi-agency effort to reverse the serious decline in abundance of this globally significant species.

Detailed information about OMNR's 2008 stocking activities is found in Appendix C.

7.2 Fisheries Management Plans

Bay of Quinte Fisheries Management Plan

The Ministry of Natural Resources along with stakeholder partners completed a fisheries management plan for the Bay of Quinte (BQFMP). The plan focused on the sustainable use of the fish communities in the Bay of Quinte and on improving communications among government agencies and stakeholders by providing a framework for coordinated and cooperative management. The BQFMP provides direction for the management of the fisheries resource in the Bay of Quinte for a period of five years. The BQFMP integrates with the goals and recommendations of both the Remedial Action Plan (RAP) for the Bay of Quinte and the Bay of Quinte Fish Habitat Management Plan (BQFHMP). Highlights from the BQFMP include:

- Continuing monitoring fish populations and monitor effectiveness of new regulations,
- Establishing stakeholder partnerships (recreational, commercial and First Nations) to enhance sustainable management the Bay of Quinte fishery,
- Enhancing enforcement efforts on the Bay of Quinte, and
- Increasing education and communication efforts with the public.

In 2008, the BQFMP was placed on the province's Environmental Registry (EBR) for public comment. All comments have been compiled and will be responded to in an upcoming decision notice to be posted on the EBR this spring.

Target Setting and Status

The BQFMP included establishing performance targets for target species that could be used to evaluate management actions. The species targets were established as mean catches ± the standard error from 2002-2006, and were thought to reflect the state of fish populations now that the population of walleye, the bay's dominant predator, has stabilized. Trawl data (see Section 2.5) are used to track young of the year (YOY) fish abundance. NSCIN (see Section 2.7) and gillnet data (see Section 2.4) are used to track juvenile and adult fish abundance. Some gear types are better suited to monitor certain fish species, therefore, not every species had targets developed for all netting protocols.

Apart from yellow perch caught from gillnets set in the Bay of Quinte and northern pike taken in NSCIN trapnets from upper bay sites, targets have been met or exceeded (Table 7.2.1.).

TABLE 7.2.1. Progress on performance targets from the BQFMP. Arrows indicate whether 2008 index surveys exceeded, met, or failed to meet performance targets. N.A. designations indicate that the sampling gear does not sample the species of interest and is not used to establish a target. Initial NSCIN Targets were developed for both the upper and lower bay, however, limited sampling of the lower bay restricts this analysis to the upper bay only.

	YOY Larval Trawls	NSCIN Upper Bay	Gillnets (BoQ)	Gillnets Outlet Basin
Walleye	↑	↑	↔	↔
Yellow Perch	↑	↑	↓	N.A.
Smallmouth Bass	N.A.	↔	N.A.	N.A.
Largemouth Bass	N.A.	↔	N.A.	N.A.
Northern Pike	N.A.	↓	N.A.	N.A.
River Redhorse	N.A.	↔	N.A.	N.A.

Hamilton Harbour and Watershed Fisheries Management Plan

The OMNR and Royal Botanical Gardens have developed a Fisheries Management Plan for Hamilton Harbour and its watershed (HHWFMP) in partnership with the federal and municipal governments, Hamilton and Halton Region Conservation Authorities, several regional conservation groups and a number of local stakeholders. These partners worked on the HHWFMP through the Steering Committee, Science and Technical Committee, or Anglers Working Group. The HHWFMP provides direction for the management of the fisheries resource in Hamilton Harbour and its watersheds.

The HHFMP integrates with the Remedial Action Plan (RAP) for Hamilton Harbour, by incorporating and building on many of the goals, recommendations, and targets of the RAP. Highlights from the draft HHWFMP include plans to:

- mitigate the impacts of barriers to fish migration on several Hamilton Harbour tributaries,
- restore shoal habitats for spawning and living space for warmwater and coldwater fish communities (e.g. smallmouth bass, walleye, yellow perch, lake herring, lake whitefish), and
- restore cisco populations to Hamilton Harbour and western Lake Ontario.

A draft of the HHWFMP will be posted on the Environmental Bill of Rights (EBR) registry website for final public review in March 2009. Comments made to the EBR registry will be addressed, and a completed plan is expected by summer 2009.

7.3 Native Species Restoration

OMNR works with many partners – government agencies, non-government organizations and interested individuals – at local, provincial and national levels, to monitor, protect and restore the biological diversity of fish species in the Lake Ontario basin (including the lower Niagara River and the St. Lawrence River downstream to the Quebec-Ontario boarder). Native species restoration is the center piece of LOMU's efforts to restore the biodiversity.

A number of fish species have been lost or persist in low numbers in the Lake Ontario basin. Table 7.3.1 lists twenty-two fish species that formerly occurred or are currently 'rare' in the Lake Ontario basin. Three of these species, two deepwater ciscoes, the blackfin cisco (note that there is debate about historic existence of blackfin cisco in Lake Ontario), and the Lake Ontario Kiyi, and blue pike (a subspecies of walleye) are thought to be extinct. Four species, Atlantic salmon, lake trout, bloater, and shortnose cisco have been extirpated (i.e. local extinction) from the Lake Ontario basin. Four species, American eel, burbot, deepwater sculpin and lake sturgeon that were once very common in the basin are now considered to be rare. The remaining species on this list were either uncommon historically or their historic status is uncertain. In addition, we acknowledge that there may be other species (small cyprinids for example) that may have been present historically but were lost prior to their documentation of their presence in the basin.

The sections below describe the planning and efforts to restore lake trout, Atlantic salmon, American eel, lake sturgeon and deep-water cisco. Success restoring these native species would be a significant milestone in improving Ontario's biodiversity. Observations of rare fish species, other than those covered in detail below, in the Lake Ontario and its tributaries during 2008 included:

Burbot: 1 specimen captured in Lake Ontario off Wellington (see Section 2.4);

Deepwater sculpin: 2 specimens captured in Lake Ontario off Rocky Point (see Section 2.5);

Pugnose shiner: 11 specimens were captured at 12 sites in upper St. Lawrence River, see Section 10.4;

River redhorse: 16 specimens captured in the upper Bay of Quinte (see Section 2.7).

TABLE 7.3.1. Status of 'rare' fishes in the Lake Ontario basin and their designation (as of December 31, 2008) under the Ontario Endangered Species Act (ESA) and the Canadian Species at Risk Act (SARA).

Name	Status in Lake Ontario Basin	ESA Designation	SARA Designation
American Eel, *Anguilla rostrata*	Historically very abundant throughout the nearshore zone of the basin; now rare.	Endangered	proposed as Special Concern Pending public consultation
Atlantic Salmon (Lake Ontario population), *Salmo salar*	Historically abundant throughout Lake Ontario and major tributaries; Extirpated prior to 1900's; restoration efforts underway.	Extirpated	proposed as Extirpated, pending public consultation
Bigmouth Buffalo, *Ictiobus cyprinellus*	Rare historic observations; one recent observation in Lake Ontario.	Special Concern	Not at Risk
Black Redhorse, *Moxostoma duquesnei*	Historic abundance unclear; currently found at low abundance in Spencer Creek.	Threatened	No Status
Blackfin cisco, *Coregonus nigripinnis*	Historically abundance in offshore pelagic zone is unclear; thought to have become extinct by 1900.		Threatened
Bloater, *Coregonus hoyi*	Historically abundant in offshore pelagic zone; extirpated; last recorded in 1983.		Not at Risk
Blue Pike, *Sander vitreus glaucus*	Historically abundant in western Lake Ontario and Niagara River; extinct prior to 1970's.	Extinct	Extinct
Bridle Shiner, *Notropis bifrenatus*	Historic abundance unclear; Currently at low abundance in upper St. Lawrence River and tributaries, as well as Napanee River and Bay of Quinte	Special Concern	Special Concern
Burbot, *Lota lota*	Abundant in the offshore zone up to the 1920; declined steadily to virtual extirpation by about 1950; now rare.		
Channel Darter, *Percina copelandi*	Historic abundance unclear but occurred in the upper St. Lawrence River; currently found at low abundance in Moira River (including the Skootamatta River) and Salmon River.	Threatened	Threatened
Cutlip Minnow, *Exoglossum maxillingua*	Historic abundance unclear; Currently at low abundance in St. Lawrence River and tributaries.	Threatened	Not at Risk
Deepwater Sculpin (Great Lakes population), *Myoxocephalus thompsonii*	Historically very abundant in offshore pelagic zone; currently rare.	Not at Risk	Special Concern
Grass Pickerel, *Esox americanus vermiculatus*	Historic abundance unclear; currently in low abundance in St. Lawrence River, Lake Consecon, Wellers Bay.	Special Concern	Special Concern
Lake Ontario Kiyi, *Coregonus kiyi orientalis*	Historically abundant in offshore pelagic zone; extinct; last recorded in 1964.		Extinct
Lake Sturgeon (Great Lakes and Western St. Lawrence populations), *Acipenser fulvescens*	Common in the nearshore zone and large tributaries throughout the basin prior to 1900; now rare.	Special Concern	proposed as Threatened pending public consultation
Lake trout, *Salvelinus namaycush*	The most abundant piscivore in the offshore zone up to the 1920s; declined steadily to virtual extirpation by about 1950; Restoration efforts underway.		
Pugnose Shiner, *Notropis anogenus*	Historic abundance is unclear; currently at low abundance in Thousand Islands area of St. Lawrence River.	Endangered	Endangered
Redside Dace, *Clinostomus elongatus*	Historic abundance unclear, but occurred in tributaries from Oshawa to Hamilton; currently rare.	Endangered	Special Concern
River Redhorse, *Moxostoma carinatum*	Historic abundance unclear; currently at low abundance in Bay of Quinte and Trent River.	Special Concern	Special Concern
Shortnose Cisco, *Coregonus reighardi*	Historically abundant in offshore pelagic zone; extirpated; last recorded in 1964.	Endangered	Endangered
Silver Shiner, *Notropis photogenis*	Historic abundance unclear; currently at low abundance in Bronte Creek.	Special Concern	Special Concern
Spotted Gar, *Lepisosteus oculatus*	Limited historic abundance in sheltered nearshore zone; two recent observations in Bay of Quinte and East Lake.	Threatened	Threatened

Lake trout

Lake trout were extirpated from Lake Ontario during the 1950s. The loss of this key predator of the offshore and valued commercial species caused both ecological and economic damage. The rehabilitation of lake trout in Lake Ontario began in the 1970s with sea lamprey control, and stocking of hatchery fish. The first joint Canada/U.S. plan outlining the objectives and strategies for the rehabilitation efforts was formulated in 1983, and revisions in 1990 and 1997 were made to evaluate the methodology and the progress of rehabilitation.

A revision of the plan to rehabilitate lake trout in Lake Ontario is expected to be formally adopted in 2009. The current revision comes at a time when we have seen the promising signs of naturally produced lake trout, but also experienced setbacks in survival of stocked hatchery juveniles, and declining numbers of mature fish. The rehabilitation plan reaffirms the core strategies of stocking and protection of stocked fish (sea lamprey and harvest control), but it also identifies the reduced survival of stocked juveniles as a key issue to be addressed. Ecosystem impediments to restoration and strategies to mitigate them are also discussed.

Atlantic salmon

Atlantic salmon were extirpated from Lake Ontario by the late 1800s, primarily as a result of the loss of spawning and nursery habitat in streams. They were a valued resource for aboriginal communities and early Ontario settlers. As a top predator, they played a key ecological role in the offshore fish community. As such, Atlantic salmon are recognized as an important part Ontario's natural and cultural heritage.

A unique partnership has been established to help bring back wild, self-sustaining populations of Atlantic salmon to Lake Ontario. This partnership, initiated in 2006, brings together the Ministry of Natural Resources and the Ontario Federation of Anglers and Hunters (O.F.A.H.) and a strong network of partners and sponsors.

Australia's Banrock Station is lead sponsor for this initiative and has committed $1.25 million over 5 years. Banrock Station is a world leader in corporate commitment to the environment, supporting conservation projects world-wide. The Lake Ontario Atlantic Salmon Restoration Program is the largest project they have supported outside of Australia.

The LCBO adopted Atlantic salmon as the "flagship" species for its Natural Heritage Fund, established to protect Ontario's natural heritage by preserving and expanding wildlife habitat. The LCBO has committed $250,000 over 5 years.

Over 50 other conservation organizations, corporations and community groups are contributing to the program, including the Canadian Sportfishing Industry Association, Fishing Forever Foundation, Fleming College, Department of Fisheries and Oceans, Trout Unlimited Canada, Greenbelt Foundation, Trees Ontario Foundation and local conservation authorities. About 100 schools and outdoor education centers are participating in a classroom hatchery program designed to actively involve youth in local restoration efforts.

Funding and in-kind support from all partners will contribute to enhanced fish production, habitat rehabilitation and stewardship initiatives, a research and assessment program and public education and outreach activities.

Restoration is currently focused on three "best-bet" streams—the Credit River, Duffins Creek and Cobourg Brook. These systems offer good quality spawning and nursery habitat for Atlantic salmon and community support is strong. Demonstrated success in these systems will pave the way for restoration of Atlantic salmon to other suitable streams in the future. Stocking levels have been increased to help us meet restoration targets in the selected streams and more effectively assess the rate of adult returns and production of wild juveniles. Fall surveys showed that spring-stocked fry were growing and surviving well in all three streams (see Section 2.9).

American Eel

American eel are identified as an 'Endangered' species under Ontario's Endangered Species Act. In addition, the Committee on the Status of Endangered Wildlife in Canada recommended that American eel be identified as a species of 'Special Concern' under the Canadian Species at Risk Act (Table 7.3.1). These designations have lead to additional efforts to protect American eel in Ontario. Several actions were taken by the Lake Ontario Management Unit during 2008 to address the low abundance of eel.

Staff collaborated with Ontario Power Generation on the operation of the eel ladder at the R.H. Saunders Hydroelectric Dam (see Section 2.3). The number of small eel migrating upstream at the ladder, located at the R.H. Saunders Hydroelectric Dam on the St. Lawrence River, remains at a very low level.

The abundance of larger 'yellow' eel in the upper St. Lawrence River and eastern Lake Ontario remains at very low levels as was measured by three assessment programs during 2008. Bottom trawling in the Bay of Quinte has been conducted since 1974 as part of the fish community index program (Section 2.5). The average catch of American eel for 1974 to 1994 was 0.94 eels per trawl; however no eels were captured in the 300 trawls conducted between 2003 and 2008. This suggests that eels are at a very low abundance in the Bay of Quinte.

Quantitative electrofishing has been conducted at in the upper St. Lawrence River in the Mallorytown area and in the east end of Lake Ontario (Main Duck Island and Yorkshire Bar) for 15 years and 25 years, respectively. Fishing is conducted during both the day-time and the night-time. During 2008, fishing was conducted by Dr. J. Casselman, L. Marcogliese and J. Rorabeck of Queens University with the financial support provided by the Ontario Ministry of Natural Resources. At Main Duck Island, 18 transects were run both day and night, for a total of 36 transects during 2008. The average transect was 0.35 ha in area and 517 m in length. Only one eel was captured during this part of the survey. At Mallorytown, 23 transects were surveyed. The average area of each transect was 0.29 ha and length was 433 m. In total, one eel was captured in 2008 at Mallorytown. At both locations and times of day, the catch rates were not statistically different than the previous year, and were not statistically different than 0. These low catch rates continue the trend of very low abundance of American eel in these locations (Fig. 7.3.1).

Nearshore trapnetting was conducted in the Upper Bay of Quinte, Hamilton Harbour, Lake St. Francis, Presqu'ile Bay and Weller's Bay using the NSCIN fish community index protocol during 2008 (see Section 2.7). All of these areas are within the historical range of the eel; however eel were only captured at Lake St. Francis (0.19 eel per net) the location that is furthest downstream.

Lake Ontario Management Unit staff participated in the development of a management plan for American eel in Canadian waters in cooperation with the Department of Fisheries and Oceans Canada and the Province of Quebec. In addition, staff participated in the development of a restoration plan for American eel in the waters of Lake Ontario and the upper St. Lawrence River in cooperation with the Great Lakes Fisheries Commission, New York State Department of Environmental Conservation, United States Fish and Wildlife Service, Department of Fisheries and Oceans Canada and the Province of Quebec. Staff also facilitated development of a decision support tool that will identify barriers to eel migration and prioritize eel habitat restoration activities. Staff promoted a bi-national approach to eel management by publishing articles in the American Fisheries Society symposium on 'Governance of Fisheries Issues' and participating in meetings with the Atlantic States Marine Fisheries Commission.

OMNR staff assisted Ontario Power Generation and Fisheries and Oceans Canada in the implement an action plan to improve eel abundance in Lake Ontario and the upper St. Lawrence River and improve passage of eel around hydroelectric generating facilities in the St. Lawrence River. In one component of this plan, staff assisted Ontario Power Generation in health assessment and stocking of 2.3 million glass eel into the upper St. Lawrence River and the Bay of Quinte (see Section 7.1). On May 15 and 29, 2008, approximately 797,000 and 518,000 elvers respectively, were stocked in the St. Lawrence River near Mallorytown Landing. Elvers (approximately 686,000) were also stocked on June 11, 2008 near Deseronto, in the Bay of Quinte. Prior to stocking, health screening was conducted at the Atlantic Veterinary College, and the testing results for viruses and parasites (including Anguillocoides crassus) were all negative.

Fisheries and Oceans Canada conducted exploratory electrofishing following the stocking activities on May 29 and 30, 2008 near Jones Creek on the St. Lawrence River (i.e. near the Mallorytown Landing stocking site). Many small elvers stocked the previous day (approximately 100) were observed and three small eels were captured through electrofishing (total length 22 - 27 cm). Testing determined that the three small eels were age 2+ and were from the 2006 stocking.

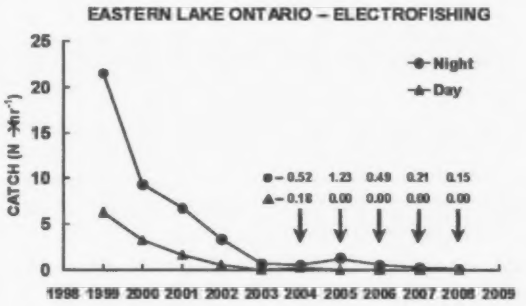

FIG. 7.3.1. Electrofishing catch of American eel (numbers caught per hr) in eastern Lake Ontario, separated by day and night for a recent period of 1999-2008.

Additional sampling was undertaken from Sept. 22 – 25, 2008 in the Upper St. Lawrence River and Bay of Quinte near the stocking sites. During the fall sampling, 34 and 32 eels were caught in the St. Lawrence River and the Bay of Quinte, respectively. The eels captured from the St. Lawrence River were from eels stocked in 2006, 2007 and 2008, while the eels from the Bay of Quinte could only come from the 2008 stocking program. Other fishing capture methods (trap nets, modified trap nets) were not effective at capturing elvers or larger stocked eels.

In a second component of the OPG Action Plan, OMNR staff assisted in the capture, tagging and transport of 1,177 large yellow eels from the St. Lawrence River and Lake Ontario to Lac St. Pierre (a section of the St. Lawrence River below all barriers to downstream migration). This study was undertaken by Ontario Power Generation as a pilot project to investigate the economics and practical feasibility of a trap and transport system as an option for mitigating turbine mortality at the Saunders GS during the downstream migration of mature silver eels. The project involved local commercial fish harvesters, staff from OMNR, Raisin River Conservation Authority and Quebec Ministère des Ressources Naturelles et de la Faune (MRNF).

Large yellow eels (minimum size > 80 cm or approximately 2.5 lb) were caught by commercial fish harvesters in the upper St. Lawrence River and Lake Ontario upstream of Saunders (USLR-LO) and in Lake St. Francis. In the USLR-LO, 15 commercial fish harvesters caught 238 large yellow eels. Fishing started in the first week of May and ceased on June 20, 2008. The Lake St. Francis fishery consisted of one commercial fish harvester who started fishing on May 5, 2008 and finished on June 3, 2008. The Lake St. Francis commercial fish harvester captured 1,016 eels that met the size criteria. Comparison of catch rates from the commercial fisher in Lake St. Francis versus the contract fishers from the USLR-LO showed that the catch rates from Lake St. Francis are close to 40 times greater than those from the USLR-LO suggesting that yellow eel abundance is much higher in Lake St. Francis than in the USLR-LO. This comparison is consistent with results of the nearshore trap netting studies discussed earlier.

Eels from the two lakes were transported to holding facilities at the OMNR's Glenora Research Station (USLR/LO) or to the fisher's facilities at Bainsville, Ontario (Lake St. Francis). A passive integrated transponder (PIT) tag was implanted in each eel for subsequent identification and biological data were collected.

A total of 1,177 eels were released to Lac St. Pierre (1,016 captured from Lake St. Francis and 161 from USLR/LO) between May 14 and June 20, 2008. The release points were predetermined with the purpose of distributing eels throughout Lac St. Pierre based on the criteria outlined by the MRNF. During the release program, all the eels were observed to be in good health.

Yellow eels were successfully captured, held, and transported down stream where they were released. The immediate mortality of large yellow eels during trap and transport was relatively low. Six eels died in the holding facilities at Glenora and 16 eels died during transport to Lac St. Pierre (1.75 % total mortality of captured eels).

To monitor the long-term survival, condition, maturation and migration of the transported yellow eels, biologists from MRNF attempted to recover tagged eels in the silver eel fishery in the St Lawrence River estuary. MRNF sampled 23 fish harvesters from Sept. 15 to Nov. 4, 2008 and scanned approximately 50% of the total harvest of silver eels for PIT tagged eels. 48 PIT tagged eels from the trap and transport research were identified. Tests done by MRNF using silver eel indices show that these tagged eels have the characteristics of migrating silver eels.

The 2008 trap and transport project was successful in demonstrating that most large yellow eels can be held in captivity, tagged, transported and released without obvious detrimental effects. The pilot project also indicated that effects of trap and transport on eels can likely be evaluated by monitoring tagged eels in the silver eel fishery in the St. Lawrence estuary.

Lake Sturgeon

Lake sturgeon are a long-lived fish species, native to Lake Ontario. Their abundance in Lake Ontario declined to low levels before 1900; the specific cause of which is not fully understood. A restoration plan for lake sturgeon in Lake Ontario is in development. In the interim, a project was conducted in 2008 to examine spawning lake sturgeon.

In early June 2008, a short gillnetting project was undertaken to determine if sturgeon were still using several historically-known spawning locations. This is the first project specifically targeting sturgeon undertaken by LOMU in recent years.

A total of 20 sets were made in three locations (see Fig. 7.3.2): Trent River (12 sets), Bay of Quinte near

the mouth of the Moira River (5 sets) and the Napanee River (3 sets). Large mesh (203 mm) gillnets were used, set in relatively shallow locations (average depth 3 m). To minimize mortality, gillnets were set for short durations (average set time 1 hr 49 min). The average water temperature of the netting locations was 18° C.

No lake sturgeon were captured during this program. Since the gear being used was designed to be species – specific (large-bodied lake sturgeon), by-catch was low. The few non-target species captured consisted of common carp and freshwater drum. Operational constraints dictated that this program occur in early June; in future years, netting earlier in the year in cooler water temperatures may improve the odds of successfully capturing sturgeon.

Deep-water Cisco

The Lake Ontario Management Unit continued efforts to assess the feasibility of restoring deepwater ciscoes to Lake Ontario continue during 2008 through a partnership between OMNR, New York State Department of Environmental Conservation (NYSDEC), the Great Lakes Fishery Commission (GLFC), and others.

Deepwater cisco (*Coregonus hoyi*), commonly called bloater, once dominated the deepwater fish community of Lake Ontario. Although the species is considered "not at risk" in Ontario by the Committee on the Status of Species at Risk in Ontario (COSSARO) because of healthy populations in Lakes Huron and Superior, it has been extirpated from Lake Ontario since the late 1950s. Current ecological conditions have improved providing an opportunity to restore this important prey species: food resources are present (*Mysis spp*), abundance of non-native competitor species has declined, deepwater commercial fishing is rare, and contaminant loads are declining. This restoration effort is consistent with OMNR's strategic directions as outlined in Our Sustainable Future and in Ontario's Biodiversity Strategy, and with the guiding principles and management objectives for the offshore deepwater fish community described in the Lake Ontario Committee's *Fish Community Objectives* (1999).

OMNR, NYSDEC, the Great Lakes Fishery Commission have been collaborating on experimental efforts to restore deepwater ciscoes since 2000. Specific activities have included life history and genetic studies, disease screening, collections of eggs, and preliminary evaluation of hatchery culture techniques.

During 2008, plans were developed to explore experimental rearing with the target of culturing fry at the NYSDEC facility at Cape Vincent, NY, to the point they could be released into Lake Ontario. During the autumn, potential collection opportunities were explored on Lakes Huron, Superior, and Michigan. The objectives of the collection effort, planned for January 2009, were to improve the reliability of egg collection, to continue refining hatchery culture techniques and to rear a small number of fry that can be stocked into Lake Ontario. Through a partnership

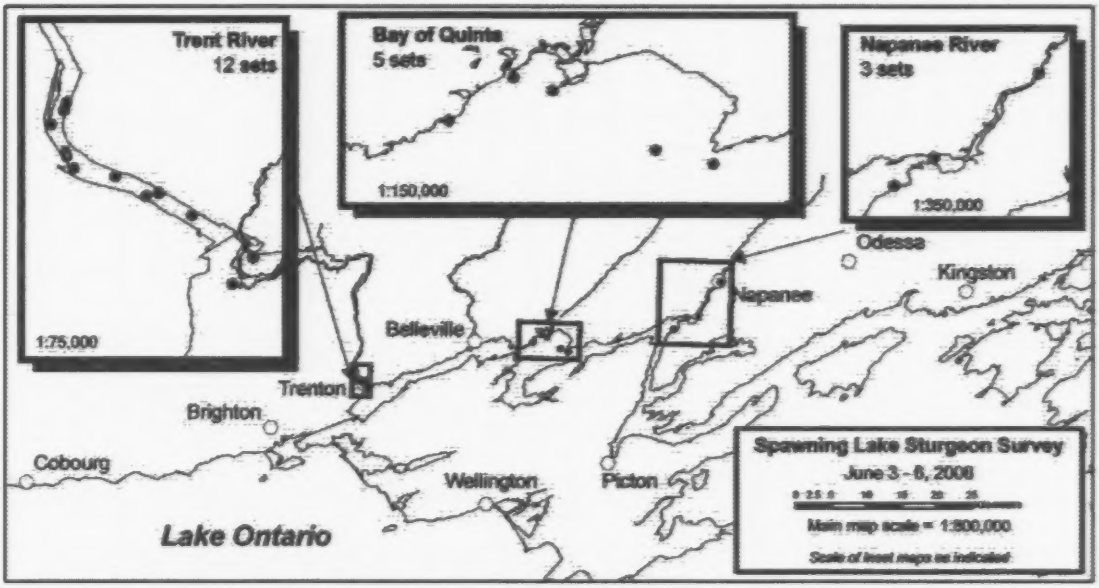

FIG. 7.3.2. Map of gillnetting locations for the 2008 lake sturgeon spawning survey.

with the Chippewa/Ottawa Resource Authority in Sault Ste. Marie, Michigan, deepwater ciscoes were going to be collected in spawning condition by commercial fishers in Lake Michigan during January or February. Once fertilized, and disinfected, the eggs were to be transported to an isolation hatchery facility at Cape Vincent, New York. All parent fish were to be screened for disease by the NYSDEC's state pathologist and genetic samples will be collected to allow later identification of the progeny. A complete, lake-wide restoration plan is being developed for Ontario's stocking strategy.

7.4 Lake Ontario Fisheries Management Zone 20 Advisory Council

The province of Ontario has proposed a new ecological framework for recreational fisheries management in Ontario to ensure resource sustainability and to optimize angling opportunities. This approach is consistent with the Ministry of Natural Resources (OMNR) strategic direction outlined in "Our Sustainable Future" and with the policy principles stated in the Strategic Plan for Ontario Fisheries (SPOF and SPOF II). The new ecological framework focuses on:

- creating new fisheries management zones (FMZ) based on biological, climatic, and social factors in order to provide a sound framework for fisheries management,
- developing regulatory "tool kits" for different sport fish species to establish broad, zone-wide standards and ensure regulations are based on sound science,
- monitoring fisheries in a standardized fashion to engage an adaptive management approach and to enable state of the resource reporting, and
- enhancing public input and involvement through creation of stewardship councils in each fisheries management zone.

During 2008 a fisheries advisory council was established for Zone 20. The council is comprised of 18 members including recreational fishers, commercial fishers, the Ontario Commercial Fishing Association, the Ontario Federation of Anglers and Hunters, Trout Unlimited, Muskies Canada, the Ontario Sportfishing Guides Association, Academia (Queen's University), and many angling groups with interest in both cold and warm water fisheries. The council will provide an opportunity for dialogue between the Lake Unit and stakeholders regarding issues and management actions.

To date the council has met twice focussing on fisheries issue identification, prioritization, and finalizing a terms or reference. Future meetings will focus on specific regulation changes and Lake

7.5 Lake Ontario Commercial Fishing Liaison Committee

The Lake Ontario Commercial Fishing Liaison Committee (LOLC) provided recommendations to the Lake Ontario Manager on issues on management of the commercial fishery during 2008. The LOLC is comprised of 14 elected members including fishers representing different management zones, buyers/ processors, and a representative of the Ontario Commercial Fisheries' Association (OCFA). The LOLC provides a forum for two-way dialogue between the Lake Unit and the commercial industry where issues are identified and management actions are discussed. After vetting with the LOLC, the management actions are presented to the Annual General Meeting of all licensed commercial fishers.

During 2008, the LOLC met five times focussing on the following issues: the total allowable catch for lake whitefish, which was reduced by ½ from 2007 levels during 2008 (see Section 4.1) in order to better reduce risk of over harvest to the existing stock; extension of the lake whitefish season into the spring time with an observer to evaluate bycatch and to gather biological data; continuation of an experimental commercial harvest of northern pike in entrapment gear; an experimental transfer of walleye quota from entrapment gear to limited mesh size gillnets; the continuation of the pool system, in place since 2006, for allocation of unused quota among active fishers; a cooperative trap-and-transfer program, in partnership with Ontario Power Generation, where American eels caught by commercial fishers in Lake Ontario and Lake St. Francis were PIT tagged and moved below dams on the St. Lawrence River; and the implications of new endangered species legislation.

During 2008, OCFA, in partnership with the Lake Unit, supported an onboard observer who gathered extensive catch, bycatch, and biological samples from the commercial fishery during April-June. Samples were collected during the northern pike and lake whitefish spring fisheries. These data were used to evaluate the performance and effects of these fisheries (see Section 4.2 and 4.3).

8. Research Activities

8.1 Offshore Food Web

Invasion induced changes in the Lake Ontario offshore pelagic food web and implications for deepwater cisco establishment

Project Leader: T. J. Stewart, Lake Ontario Management Unit and University of Toronto

This project is assembling information to quantitatively assess trophic interactions to describe changes to the structure of the Lake Ontario offshore pelagic food web in response to disruptive influences during the 1990s and assess potential ecological consequences of re-establishing deepwater cisco. During the 1990s, invasive species disrupted the Lake Ontario food web. The disruptive influences included the expansion of dreissenid mussels (*Dreissena spp.*) which was associated with increases in water clarity and the population collapse of *Diporeia*. The invasive predatory cladoceran *Bythotrephes longimanus* invaded in 1984 but was abundant only sporadically prior to 1990 and another predatory cladoceran, *Cercopagis pengoi* invaded and became abundant in 1998. The combined effect of reductions in phosphorus loading and the filtering effects of dreissenids led to declines in Lake Ontario phytoplankton biomass and zooplankton abundance, biomass, and production. Alewives (*Alosa pseudoharengus*) are the dominant prey fish in Lake Ontario and their response to observed ecological changes affects the structure of the Lake Ontario food web. Efforts are being made to re-introduce deepwater cisco to Lake Ontario to restore the native pelagic fish assemblage and increase biodiversity. Deepwater cisco (*Coregonus kiyi and hoyi*) and alewife interact and dynamically co-exist in Lake Michigan, which has an offshore food web structure similar to Lake Ontario. We use historical Lake Michigan deepwater cisco and alewife population fluctuations to characterize possible biomass stanzas for alewife and re-established deepwater cisco populations in Lake Ontario. Using mass-balance food-web models before and after the disruption, and assumed deepwater cisco and alewife biomass stanzas, we assess the potential ecological consequences of re-establishment of deepwater cisco in Lake Ontario.

In 2008, we continued to assemble and analyze information to quantify the components of the Lake Ontario food web. Here we summarize the consequences of the food web disruption to the production, consumption, bioenergetics, and trophic interactions of Lake Ontario alewife.

We developed stochastic population-based bioenergetic models of Lake Ontario alewife with bootstrapping for 1987-1991 and 2001-2005 to test whether production, consumption, and associated bioenergetic ratios changed after invasive-induced food web disruption. Alewife mean annual biomass (30.0 $g \cdot m^{-2}$ to 16.0 $g \cdot m^{-2}$), production (95.6 $g \cdot m^{-2} \cdot yr^{-1}$ to 35.6 $g \cdot m^{-2} \cdot yr^{-1}$) and consumption (540.5 $g \cdot m^{-2} \cdot yr^{-1}$ to 210 $g \cdot m^{-2} \cdot yr^{-1}$) declined after the disruption, but none of the changes was statistically significant. Population-based bioenergetic ratios of production to consumption (P/B), consumption to production (Q/B) and production efficiency did not change. We observed statistically significant changes in the Q/B for invasive predatory cladocerans (0.5 to 1.2), and *Mysis* (0.4 to 2.4), and "other" prey (0.8 to 0.1), but the observed decline in zooplankton Q/B (16.9 to 10.3) was not significant. Individual alewife gross conversion efficiency (GCE) declined with age, and after the disruption, increased significantly for yearlings. Our analyses support the hypothesis that, after 2003, alewife could not sustain their growth while feeding nearshore only on zooplankton. We modeled observed spatial variation in diet and thermal habitat and predicted that consumptive demand could vary from -15% to 29% from average conditions. Our results demonstrate that Lake Ontario alewife exploited spatial heterogeneity in resource patches and thermal habitat to partially mitigate the effects of food web disruption.

This research is changing our understanding of trophic relationships in the offshore Lake Ontario food web and will have implications for future rehabilitation and management of the fish community. This research relied on cooperation of the United States Geological Survey (USGS), New York State Department of Environmental Conservation (NYDEC), and the Department of Fisheries and Oceans. Support for the project was provided by the Canada-Ontario Agreement, the Great Lakes Fish and Wildlife Restoration Act, the Great Lakes Fishery Commission, and the National Sciences and Engineering Research Council.

8.2 Hemimysis

Hemimysis – *the bloody red shrimp in Lake Ontario*

Investigators: Tim Johnson, Aquatic Research and Development Section and Ted Schaner, Lake Ontario Management Unit

Hemimysis is a new invasive invertebrate first observed in Lake Ontario in 2006. In 2008, OMNR expanded its surveillance efforts to document the distribution of this invasive invertebrate and initiated field sampling to evaluate possible food web effects on resident fish. Field sampling was concentrated at 3 locations spanning the gradient of known distribution in 2007: Cobourg (established "high" density), Brighton (invasion front), and Long Point (absent). Fish diets and stable isotopes were used to assess predation on *Hemimysis* by fishes sampled in a variety of nearshore habitats in each geographic area. Of 17 fish species examined, only alewife and rock bass consumed *Hemimysis* and *Hemimysis* was not a dominate prey item at any site or date. On-going tissue analyses will explore possible changes in feeding pathways and energetic consequences of the *Hemimysis* invasion on fish growth rate.

In the fall of 2008 funds became available to conduct an extensive distributional survey along the entire Canadian shore of Lake Ontario. Using a pier-based sampling design developed by Fisheries and Oceans Canada, we sampled 19 locations from Niagara-on-the-Lake to Gananoque between October 28 and November 12. All sampling was done at night when *Hemimysis* move up into the water column and become more vulnerable to our nets. *Hemimysis* were found at all locations west of Prince Edward County (except Port of Newcastle) as well as Waupoos, Glenora, Collins Bay, and Gananoque (see map below). Most individuals were small juveniles (mean length 7.18 mm); no gravid females were found. Densities ranged from 0.14 m^{-3} (Glenora) to 417/m^{-3} (Bronte Harbour). At all locations, *Hemimysis* showed strong affinity for structure (sides of the pier and / or armour stone.

A pilot study near Cobourg began to explore three-dimensional density and distribution by using horizontal towed and vertical nets (0.75m, 650 µm). Catches were extremely low (0-61 individuals per 10 min tow) precluding our ability to describe patterns in density associated with depth, substrate, and / or distance from structure. We plan to repeat this exercise in 2009 at Waupoos which is more protected and much closer proximity to our base, and 2008 densities were comparable to Cobourg.

This project benefited from advice and equipment supplied by Kelly Bowen, Fisheries and Oceans Canada. Financial support for this project was provided by OMNR, the provincial Invasive Species Centre and the Canada-Ontario Agreement.

FIG. 8.2.1. Sightings of *Hemimysis anomala* in Lake Ontario in 2008.

8.3 Lake Whitefish

Health of lake whitefish in eastern Lake Ontario

Investigator: Tim Johnson, Aquatic Research and Development Section, Jim Hoyle, Lake Ontario Management Unit, and Michael Arts, Environment Canada

Lake whitefish *Coregonus clupeaformis* are an economic and ecologically important fish throughout the Great Lakes basin. During the past decade, lake whitefish growth and condition has declined for many stocks. We used a variety of morphometric and physiologic indicators to compare the relative health of the two dominant stocks in Lake Ontario. Fish spawning in the lower Bay of Quinte are younger and smaller than those spawning in the lake proper. Even after correcting for differences in body size, Bay fish were of poorer condition (relative weight) and had lower total lipids and essential fatty acids. Energy density of Bay fish was marginally higher owing to a significantly higher nitrogen content. While it is assumed both stocks cohabitate during the non-spawning season, stable isotope signatures revealed Bay fish were more depleted in $\delta^{13}C$ and slightly enriched in $\delta^{15}N$ suggesting different trophic experience. Following the near collapse of lake whitefish stocks in eastern Lake Ontario in the mid 1990s, the Bay stock is now growing slower and maturing at a later age which may be impacting

recovery potential. Our analyses suggest Bay fish have been more heavily impacted by ecological change than the Lake stock and differences in nutritional history have resulted in their poorer performance.

This project was supported by OMNR and the Canada-Ontario Agreement.

8.4 Small fish sampling

Development of a nearshore, smallfish sampling methodology

Investigator: Tim Johnson, Aquatic Research and Development Section

Small fish (< 20cm) in the nearshore (<5m) of lakes are a group of fish that are poorly sampled by most fishery agencies. However, this zone represents spawning and / or nursery habitat for most species of fish, represents an area of tremendous biodiversity due to the diversity of microhabitats, and is also the area most often associated with the arrival of invasive fishes. We therefore sought to evaluate different gears in terms of their effectiveness for capturing the diversity of smallfish in the shallow, nearshore region of the Great Lakes. A literature search and solicitation of expert advice, an online survey including 155 Great Lakes responses, and a workshop of OMNR field personnel led to the recommendation to evaluate fyke nets, small-mesh gillnets, and beach seines in 2008. All three gears were deployed in spring, summer, and fall at 4 geographic locations in eastern Lake Ontario to evaluate not only their catch efficiency, but also their general performance in different hydrogeomorphic habitats. In total 30 species of fish were caught, with single gear richness highest for gillnets (27 species), followed by fyke nets (15 species), and seines (7 species). Eleven species were only caught in gillnets, 2 exclusively in seines, and 1 in fyke nets; only three species were captured in all gears. Gillnets proved effective in all habitats ranging from high energy beaches to dense macrophytes and structurally complex shorelines with extensive boulders and / or coarse woody debris. Gillnets were also the most effective gear in areas of rapidly changing depth.

Since 2001, the Lake Ontario Management Unit has been incorporating the provincial standard nearshore community index netting (NSCIN) into its assessment programs. This program uses 6-foot trapnets that consist of a coarser mesh than represented by our gear, and as a consequence the program describes a different fish community than seen with our program. Of the 30 species sampled with our small mesh gears, only 8 were represented in NSCIN samples taken from similar areas in the Bay of Quinte, and 2 unique species were captured. While not specifically nearshore, LOMU bottom trawling programs in the middle and lower Bay of Quinte sampled 5 species not seen in our gear, while we encountered 5 species not seen in the trawls. In 2009, we intend to continue our small-fish gear evaluation, but will place greater emphasis on sampling the same geographic areas as the NSCIN program on the same dates.

Support for this project was provided by OMNR and the Canada-Ontario Agreement.

9. Partnerships

9.1 Nearshore Fish Community Trapnet Studies

Nearshore community index netting (NSCIN), a provincially standardized trapnet program designed originally on inland lakes to evaluate littoral zone fish communities, was initiated on Lake Ontario in the Bay of Quinte from 2001-2005. In 2006, the NSCIN program was conducted on Hamilton Harbour and the Toronto Waterfront area with partnerships involving Ontario Ministry Natural Resources, Fisheries and Oceans Canada, and Toronto Region Conservation Authority. The Ministry of Natural Resources' Lake Ontario Management Unit (LOMU) provided equipment and expertise with the NSCIN program while partners provided experienced staff with local knowledge. The partnerships proved very successful.

The Canada-Ontario Agreement (COA) provided funding for three years (2007-2009) of NSCIN projects on a variety of nearshore and embayment location including Hamilton Harbour, the Toronto waterfront area, Presq'ile Bay, Weller's Bay, West Lake, East Lake, Prince Edward Bay, lower and upper Bay of Quinte, Long Reach and Kingston, Thousand Islands, and Lake St. Francis (see Section 2.7). Partnerships are a key delivery mechanism for these field projects. Partnerships to date (2007 and 2008 field seasons) have included Fisheries and Oceans Canada (2008), the Toronto Region Conservation Authority (2007), the Raisin Region Conservation Authority (2007 and 2008), and local commercial fishers (2007).

Some of the NSCIN project locations are Areas of Concern (AOC) with ongoing Remedial Action Plans (RAP). Fisheries Management Plans (FMP) have been or are being prepared for these AOCs (see Section 7.2), and NSCIN is being considered as a method for setting and evaluating the success of fish community targets. NSCIN projects on non-AOC areas provide contrast to help evaluate the status of fish communities/ populations in AOC areas. Other important benefits of the NSCIN projects include commercial fish harvest management and a source of fish for MOE contaminant sampling.

9.2 St. Lawrence River Muskellunge Spawning and Nursery Site Identification

The muskellunge (*Esox masquinongy*) is the largest game fish in Ontario waters. Its scattered provincial distribution is made up of several genetically distinct populations. The St. Lawrence River population produces the largest individuals in the province, and supports an important sport fishery. Concern regarding this population led to the creation of The St. Lawrence River Esocid Working Group under the supervision of the Lake Ontario Committee, of the Great Lakes Fishery Commission. The Esocid Working Group consists of members from New York State Department of Environmental Conservation (NYSDEC), the Ontario Ministry of Natural Resources (OMNR), SUNY College of Environmental Science and Forestry and the Royal Ontario Museum (ROM).

In the past the Esocid Working Group produced management plans pertaining to St. Lawrence River muskellunge, the most recent being the Update of the Strategic Plan For Management of The St. Lawrence River Muskellunge Population and Sport Fishery Phase III: 2003-2010. One objective outlined in the report was the protection of muskellunge spawning and nursery habitats. However, these habitats were not well documented or identified within the St. Lawrence River. Consequently the OMNR conducted a young of-the-year seining program from 1989-1995 in an effort to identify nursery sites within the Canadian waters of the St. Lawrence River. Efforts were discontinued following this period. During 2005-2008, efforts to identify muskellunge nursery habitats were renewed through a partnership between Muskies Canada Inc. (MCI - Gananoque Chapter), Parks Canada (St. Lawrence Islands National Park), Kemptville District MNR, Fisheries and Oceans Canada (Prescott), and the Lake Ontario Management Unit (LOMU).

Fifty-eight seining events were completed during Aug 5-27, 2008. In total, 6,433 fish were captured, representing 34 species. Yellow perch (54%), largemouth bass (6%), round goby (5%), emerald shiner (5%), rock bass (5%), pumpkinseed (4%), golden shiner (4%), banded killifish (4%), and bluntnose minnow (3%) were the most abundant species. Pugnose shiner (*Notropis anogenus*), listed as 'endangered' under both the Ontario ESA and Canadian SARA legislations (see Section 7.3), were captured during this program at 3 sites. In addition, grass pickerel, (*Esox americanus vermiculatus* – listed

as 'special concern' under both the Ontario ESA and Canadian SARA legislations) were captured at 3 sites. These important observations highlight the importance of seining programs to the identification of biological diversity of the St. Lawrence River.

During 2008, seven muskellunge were captured. Three were captured at sites which not previously confirmed as muskellunge nursery areas, while four were captured at previously confirmed sites. These data are being incorporated into NRVIS mapping of muskellunge nursery habitats by MNR - Kemptville District Office and shared with partner agencies.

9.3 Large Salmonid Predation Impacts on Post-smolts

The survival of juvenile Atlantic salmon, lake trout, rainbow trout, brown trout, and coho salmon, (except Chinook salmon) declined the mid 1990s. Increased water clarity led to an offshore redistribution of alewife during spring. We have hypothesized that, with fewer prey fish (alewife and smelt) to act as a buffer, post-smolt/stocked juvenile salmonids have became a greater target for large salmonid predators. We propose to: 1) Quantify the spatial and temporal components of the diet of large salmonids during and after the spring smolt/stocking events. 2) Determine the distribution shifts in salmonids and prey fish through the spring. 3) Model the predation intensity on small salmonids under scenarios of higher and lower prey fish density. 4) Simulate past prey density and distribution to test hypotheses related past changes in juvenile salmonid survival.

We are capturing fish with multi-mesh gangs of suspended (method by which nets are properly deployed and floating in water column at desired depth strata) and bottom gillnets using a randomly stratified sampling design (See Section 2.2). Stratification is by water depth and distance offshore. Sampling is conducted during May in Lake Ontario near streams where Atlantic salmon have been intensively stocked. Identification of prey is based on bones and otoliths for largely digested specimens thereby reducing unidentifiable components to <5%.

We have partnered with Dr. Mart Gross at the University of Toronto to conduct this study. Blake Turner is helping with extraction and analyses of the stomach contents of salmonids caught during the first two years of the survey, 2007 and 2008, and synthesizing the data as part of his MSc work. Another student will complete the extraction and analyses from the third year, 2009. Results from 2007 and 2008 indicate that the primary prey for lake trout in these samples is round goby, a relatively new species to Lake Ontario. By 2010 we will have a completed perspective on this study.

9.4 Bi-national Lake-wide Lake Trout Assessment

A lake-wide fall gillnet survey to assess the population of lake trout was completed in 2008. This is a program that is conducted annually in U.S. waters by the New York State Department of Environmental conservation (NYSDEC) and the U.S. Geological Survey (USGS). The OMNR participated in this program for over a decade, until 1995 when the function of lake trout assessment in Canadian waters was taken over by the more comprehensive Community Index Gillnetting Program (see Section 2.4). In 2008 the Lower Aquatic Foodweb Assessment (LOLA) returned to Lake Ontario on its five year rotation throughout the Great Lakes. As part of this initiative the full lake-wide lake trout survey was repeated, involving all three agencies, and covering the entire lake. The objective of the survey were to provide a population status update that is compatible both with the historical surveys in Canadian waters, and with current U.S. surveys, as well as to provide materials for dietary and physiological analyses of the lake trout, that would be synchronous with other LOLA studies conducted in 2008.

The OMNR vessel sampled five transects along the north shore of Lake Ontario between Port Hope and Long Point, as well as four individual stations in the Kingston Basin. The R/V Kaho (USGS) came into Canadian waters to sample four transects in the western portion of the lake, completing the coverage of Canadian shoreline. Sixteen transects in the U.S. waters were sampled by NYSDEC and USGS.

The catches of lake trout in the survey were low, as could be expected, given the current low population levels (see Section 2.4). A total of 74 lake trout were caught in Canadian waters, with the geographical pattern of catches consistent with the pattern of stocking. Samples were taken for fatty acid, stable isotope and thiamine analysis. A fairly high proportion of the lake trout did not have a hatchery mark, and otoliths from these fish are undergoing stable isotope analysis to identify those that were naturally produced.

APPENDIX A:
LAKE ONTARIO MANAGEMENT UNIT STAFF 2008

PETERBOROUGH
300 Water Street, 5th Floor North, Peterborough, ON K9J 3C7
Tel: 705-755-1798 Fax: 705-755-1900

Robert MacGregor – Lake Manager (January - August)
Kevin Loftus – Lake Manager (Acting)
Michelle Weller – Administrative Assistant
Marion Daniels – Management Biologist

GLENORA
R.R.#4, 41 Hatchery Lane, Picton, ON KOK 2TO
Tel: 613-476-2400 Fax: 613-476-7131

Linda Blake – Administrative Assistant
Alastair Mathers – Lake Ontario COA Coordinator
Gavin Christie – Assessment Supervisor (Acting)
Tom Stewart – Project Coordinator
Jim Bowlby – Assessment Biologist
Jim Hoyle – Assessment Biologist
Ted Schaner – Assessment Biologist
Marc Desjardins – Management Biologist
Colin Lake – Operations Supervisor
Kelly Sarley – Database Technician, Computer Operator
Dale Dewey – Operations Coordinator
Wayne Miller – Senior Technician, Base Operations
Charles Wood – Vessel Master (deceased August 18, 2008)
Dave Goodfellow – Great Lakes Technician
Tom Lawrence – Great Lakes Technician
Steve McNevin – Great Lakes Technician

Unclassified Staff:
Laura Arnot-Kucey – Project Management Biologist
Gord Meadows – Great Lakes Fisheries Technician
Tim Dale – Great Lakes Fisheries Technician
Tyson Scholz – Great Lakes Fisheries Technician
Matt Brown – Great Lakes Fisheries Technician
Sonya Kranzl – Great Lakes Fisheries Technician
Steve Wickens – Great Lakes Fisheries Technician
Gina Van Wieren – Great Lakes Fisheries Technician
Caio Camargo – Great Lakes Fisheries Technician
Keith Matthieu – Great Lakes Fisheries Technician
Ted Allan – Great Lakes Fisheries Technician
Cameron Arndt – Great Lakes Fisheries Technician
Alan McIntosh – Boat Captain, Vessel Master (Acting)
Jessica Gordon – Student Fisheries Technician
Courtney Holden – Student Fisheries Technician
Thomas Howson – Student Fisheries Technician
Jeffery Molenaar – Student Fisheries Technician, Great Lakes Fisheries Technician

LAKE ONTARIO ENFORCEMENT SECTION – GLENORA
Derrick Humber – Enforcement Supervisor, Lake Ontario
Matt Orok– Enforcement Supervisor, Lake Ontario (Acting)

Gord Rooney – Conservation Officer
Edwin Van Den Oetelaar – Conservation Officer
Randy Tippin – Conservation Officer (Vineland)

AQUATIC RESEARCH AND DEVELOPMENT SECTION – GLENORA
Dr. Tim Johnson – Research Scientist
Les Stanfield – Research Biologist
Laurie Allin – Research Technician
Nina Jakobi – Research Biologist
Carolina Taraborelli – Research Biologist
Megan Lloyst – Student Research Technician
Mike Yuille – Research Intern

Appendix B. Lake Ontario Management Unit 2008 Operational Staff Field and Lab Schedule

Field or lab project	Dates	Species assessed, monitored or stocked	Length of data series (yrs)	Lead biologist	Funding source
Ganaraska Fishway - Rainbow Trout Assessment	Mar 24 - Apr 25	Adult rainbow trout	35	Bowlby	
Commercial Catch Sampling	Seasonal	Lake whitefish, northern pike	23	Hoyle	
Lake Trout Tug Stocking	Apr 21 - May 9	Juvenile lake trout	n/a	Daniels	
Bay of Quinte Open-water Creel Survey	May 3-Nov 30	Walleye	32	Hoyle	
Large Salmonid Predation Impacts on Post-smolts	May 5 - May 23	Salmonids	2	Bowlby	COA
Lake Sturgeon Spawning Survey	May 5 - May 9	Lake Sturgeon	1	Lake	COA
American eel trap and transfer	May - June	American eel	n/a	Mathers	
Moses Saunders Eel Ladder Monitoring	May - Oct	Migrating American eel	35	Mathers	COA
Lake Ontario Angler Survey	Jun - Sept	Salmonids	32	Bowlby	
Eastern Lake Ontario and Bay of Quinte Community Index Netting	Jun 23 - Sept 12	Multiple species	51	Hoyle	
Lake-wide Hydroacoustic Assessment of Prey Fish	Jul 21 - Aug 8	Alewife, rainbow smelt and three-spine stickleback	18	Schaner	COA
Hamilton Harbour Nearshore Community Index Netting	Aug 11- Aug 22	Nearshore fish community	2	Hoyle	COA
Lake St. Francis Nearshore Community Index Netting	Aug 18 - Aug 29	Nearshore fish community	2	Hoyle	COA
Lake St. Francis Community Index Netting	Sep 8 - Sep 26	Walleye, yellow perch, northern pike	24	Schaner	COA
Upper Bay of Quinte Nearshore Community Index Netting	Sep 8 - Sep 26	Nearshore fish community	7	Hoyle	COA
Lake Trout 'Cruise'	Sep 9 - Sep 26	Lake Trout	24	Schaner	COA
Weller's Bay / Presqu'ile Bay Nearshore Community Index Netting	Sep 15 - Oct 3	Nearshore fish community	1	Hoyle	COA
Hemimysis Survey	Sep 29 - Oct 14	*Hemimysis anomala* - "bloody red shrimp"	1	Schaner	COA
Credit River Chinook Assessment	29 Sep - Oct 3	Adult chinook salmon	39	Bowlby	
Juvenile Atlantic Salmon Electrofishing	Oct 7 - Oct 24	Atlantic salmon	2	Bowlby	COA
Age and Growth	Year-round	Multiple species	n/a	Multiple	

Appendix C. Atlantic salmon stocked in the Province of Ontario waters of Lake Ontario, 2008.

SITE NAME	MONTH STOCKED	YEAR SPAWNED	HATCHERY	STRAIN/ EGG SOURCE	AGE (MONTHS)	MEAN WT (G)	MARKS	NUMBER STOCKED
ATLANTIC SALMON - EYED EGGS								
CREDIT RIVER								
Roger's Creek - Stone Pond	1	2007	Harwood	LaHave/Harwood			None	600
HUMBER RIVER								
Coffey Creek - Coffey Creek Farm	1	2007	Harwood	LaHave/Harwood			None	16,000
Coffey Creek - Fimes Property	1	2007	Harwood	LaHave/Harwood			None	3,600
	12	2008	Harwood	LaHave/Harwood			None	1,600
Coffey Creek - Markoff Property	12	2008	Harwood	LaHave/Harwood			None	975
Coffey Creek - Stewart Property	1	2007	Harwood	LaHave/Harwood			None	2,000
								24,175
ATLANTIC SALMON - ADVANCED FRY								
COBOURG BROOK								
Ball's Mill	5	2007	Normandale	LaHave/Harwood	4	0.9	None	26,974
Dale Rd.	6	2007	Normandale	LaHave/Harwood	5	1.0	None	19,634
								46,608
CREDIT RIVER								
Belfountain	5	2007	Normandale	LaHave/Harwood	4	0.8	None	31,965
Forks of the Credit - Dominion St.	5	2007	Normandale	LaHave/Harwood	4	0.8	None	31,980
Forks of the Credit Prov. Park	5	2007	Normandale	LaHave/Harwood	4	0.9	None	30,857
								94,802
DUFFIN CREEK								
East Duffin Cr. - Claremont	5	2007	Normandale	LaHave/Harwood	4	0.7	None	26,925
Ganatsekiagon Cr.	5	2007	Partnership	LaHave/Harwood	5	2.2	None	14,000
Mitchell Cr.	5	2007	Partnership	LaHave/Harwood	5	2.2	None	5,689
								46,614
ATLANTIC SALMON - FALL FINGERLINGS								
COBOURG BROOK								
Danforth Rd.	11	2007	Partnership	LaHave/Harwood	11	10.7	None	4,988
Hie / McNichol Properties	10	2007	Normandale	Sebago/Normandale	10	14.6	None	12,500
								17,488
CREDIT RIVER								
Grange Property	10	2007	Normandale	LaHave/Harwood	10	9.2	None	17,113
McLaren Rd.	11	2007	Partnership	LaHave/Harwood	11	10.0	None	14,480
								31,593
DUFFIN CREEK								
East Duffin Cr. - Greenwood	10	2007	Partnership	LaHave/Harwood	10	11.4	None	2,166
East Duffin Cr. - Pickering Museum	10	2007	Partnership	LaHave/Harwood	10	11.4	None	3,033
East Duffin Cr. - Paulynn Park	10	2007	Partnership	LaHave/Harwood	10	11.4	None	1,960
East Duffin Cr. - 5th Concession	10	2007	Normandale	Lac St-Jean/Normandale	11	10.7	None	5,558
								12,717

continued on next page

Appendix C. Atlantic salmon stocked in the Province of Ontario waters of Lake Ontario, 2008 continued.

SITE NAME	MONTH STOCKED	YEAR SPAWNED	HATCHERY	STRAIN/ EGG SOURCE	AGE (MONTHS)	MEAN WT (G)	MARKS	NUMBER STOCKED
ATLANTIC SALMON - SPRING YEARLINGS								
COBOURG BROOK								
Danforth Rd.	4	2006	Normandale	Sebago/Normandale	16	46.5	None	6,130
Hie / McNichol Properties	4	2006	Partnership	LaHave/Harwood	15	154.6	None	5,449
								11,579
ATLANTIC SALMON - SUB-ADULTS								
COBOURG BROOK								
Ball's Mill	5	2005	Harwood	LaHave/Normandale	28	272.3	PIT tag	59
	5	2005	Harwood	LaHave/Normandale	28	272.3	None	60
Hickerson Road	5	2005	Harwood	LaHave/Normandale	28	297.4	PIT tag	59
	5	2005	Harwood	LaHave/Normandale	28	297.4	None	60
								238
CREDIT RIVER								
10th Line - Oster Pond 1	5	2005	Harwood	LaHave/Normandale	28	288.0	None	200
10th Line - Oster Pond 2	5	2005	Harwood	LaHave/Normandale	28	288.0	None	200
River Road - Wallace/Dolan Pond	5	2005	Harwood	LaHave/Normandale	28	288.0	None	50
West Credit - Shaw's Creek Rd.	5	2005	Harwood	LaHave/Normandale	28	288.0	None	160
								610
DUFFIN CREEK								
West Duffin Cr. - Green River	5	2005	Harwood	LaHave/Normandale	28	288.0	None	381
HUMBER RIVER								
Finnetry Sideroad	9	2005	Harwood	LaHave/Normandale	32	591.9	PIT tag	60
	9	2005	Harwood	LaHave/Normandale	32	591.9	None	11
Palgrave Mill Dam	9	2005	Harwood	LaHave/Normandale	32	591.9	PIT tag	20
	9	2005	Harwood	LaHave/Normandale	32	591.9	None	11
								102
TOTAL - ATLANTIC SALMON EYED EGGS								24,775
TOTAL - ATLANTIC SALMON ADVANCED FRY								188,024
TOTAL - ATLANTIC SALMON FALL FINGERLINGS								61,798
TOTAL - ATLANTIC SALMON SPRING YEARLINGS								11,579
TOTAL - ATLANTIC SALMON SUB-ADULTS								921
TOTAL - ATLANTIC SALMON								287,097

Appendix C. Brown trout stocked in the Province of Ontario waters of Lake Ontario , 2008.

SITE NAME	MONTH STOCKED	YEAR SPAWNED	HATCHERY	STRAIN/ EGG SOURCE	AGE (MONTHS)	MEAN WT (G)	MARKS	NUMBER STOCKED
				BROWN TROUT - SPRING YEARLINGS				
DUFFINS CREEK								
401 Bridge	5	2006	Harwood	Ganaraska/Tarentorus	17	47.8	Ad	10,702
BRONTE CREEK								
Bronte Beach Park	4	2006	Chatsworth	Ganaraska/Tarentorus	16	28.7	Ad	15,183
LAKE ONTARIO								
Ashbridge's Bay Ramp	4	2006	Harwood	Ganaraska/Tarentorus	17	50.6	Ad	17,410
Athol Bay	5	2006	Harwood	Ganaraska/Tarentorus	17	59.6	Ad	11,335
Bluffer's Park	4	2006	Harwood	Ganaraska/Tarentorus	17	52.4	Ad	17,992
Burlington Canal	4	2006	Chatsworth	Ganaraska/Tarentorus	16	27.5	Ad	14,982
Fifty Point CA	4	2006	Chatsworth	Ganaraska/Tarentorus	16	28.7	Ad	15,183
Jordan Harbour	4	2006	Chatsworth	Ganaraska/Tarentorus	16	27.5	Ad	9,108
Lakefront Promenade	4	2006	Chatsworth	Ganaraska/Tarentorus	16	27.5	Ad	10,000
Millhaven Wharf	4	2006	Harwood	Ganaraska/Tarentorus	17	55.8	Ad	10,283
	5	2006	Harwood	Ganaraska/Tarentorus	17	47.8	Ad	5,151
Oshawa Harbour	5	2006	Harwood	Ganaraska/Tarentorus	17	49.5	Ad	14,622
Port Dalhousie East	4	2006	Chatsworth	Ganaraska/Tarentorus	16	27.5	Ad	25,182
								151,248
TOTAL - BROWN TROUT								**177,133**

Appendix C. Chinook salmon stocked in the Province of Ontario waters of Lake Ontario, 2008.

SITE NAME	MONTH STOCKED	YEAR SPAWNED	HATCHERY	STRAIN/ EGG SOURCE	AGE (MONTHS)	MEAN WT (G)	MARKS	NUMBER STOCKED
CHINOOK - SPRING FINGERLINGS								
BOWMANVILLE CREEK								
CLOCA Ramp	5	2007	Ringwood	Wild - Credit R.	6	4.0	Ad	33,000
BRONTE CREEK								
2nd Side Road Bridge	4	2007	Ringwood	Wild - Credit R.	5	4.2	Ad	22,250
5th Side Road Bridge	4	2007	Ringwood	Wild - Credit R.	5	4.2	Ad	22,250
								44,500
CREDIT RIVER								
Eldorado Park	5	2007	Ringwood	Wild - Credit R.	6	4.2	Ad/CWT	28,000
Huttonville	5	2007	Ringwood	Wild - Credit R.	6	4.2	Ad/CWT	28,000
Norval	5	2007	Ringwood	Wild - Credit R.	6	4.2	Ad/CWT	29,000
								85,000
DON RIVER								
Donalda Golf Club	5	2007	Ringwood	Wild - Credit R.	6	3.9	Ad	13,350
HIGHLAND CREEK								
Colonel Danforth Park	4	2007	Ringwood	Wild - Credit R.	5	4.2	Ad	13,350
HUMBER RIVER								
East Branch Islington	4	2007	Ringwood	Wild - Credit R.	5	4.2	Ad	13,350
LAKE ONTARIO								
Ashbridge's Bay Ramp	4	2007	Ringwood	Wild - Credit R.	5	4.2	Ad	8,900
Barcovan	5	2007	Ringwood*	Wild - Credit R.	6	5.9	Ad	9,991
Beacon Inn	4	2007	Ringwood	Wild - Credit R.	5	4.6	Ad	22,250
Bluffer's Park	4	2007	Ringwood	Wild - Credit R.	5	4.2	Ad	31,150
Burlington Canal	4	2007	Ringwood	Wild - Credit R.	5	4.2	Ad	44,500
	5	2007	Ringwood	Wild - Credit R.	6	4.4	Ad	5,500
Consecon Robinson Pt	5	2007	Ringwood	Wild - Credit R.	6	4.2	Ad	13,350
Oshawa Harbour	5	2007	Ringwood	Wild - Credit R.	6	4.0	Ad	25,000
Port Dalhousie East	4	2007	Ringwood	Wild - Credit R.	5	3.5	Ad	89,000
	5	2007	Ringwood	Wild - Credit R.	6	4.4	Ad	9,500
Shelter Valley Cr.	4	2007	Ringwood	Wild - Credit R.	5	4.2	Ad	13,500
Wellington Channel	5	2007	Ringwood	Wild - Credit R.	6	4.2	Ad	13,350
	5	2007	Ringwood*	Wild - Credit R.	6	7.0	Ad	9,995
Whitby Harbour	5	2007	Ringwood	Wild - Credit R.	6	4.4	Ad	23,000
	5	2007	Ringwood*	Wild - Credit R.	6	6.8	Ad	5,499
								324,485
TOTAL - CHINOOK SALMON								527,035

* Pen-Imprinted

Appendix C. Coho salmon stocked in the Province of Ontario waters of Lake Ontario, 2008.

SITE NAME	MONTH STOCKED	YEAR SPAWNED	HATCHERY	STRAIN/ EGG SOURCE	AGE (MONTHS)	MEAN WT (G)	MARKS	NUMBER STOCKED
			COHO - FALL FINGERLINGS					
CREDIT RIVER								
Eldorado Park	11	2007	Partnership	Wild - Credit R.	12	27.2	None	27,417
Huttonville	10	2007	Partnership	Wild - Credit R.	11	27.8	None	26,451
Norval	10	2007	Partnership	Wild - Credit R.	11	27.0	None	25,940
TOTAL - COHO SALMON								79,808

Appendix C. Lake trout stocked in the Province of Ontario waters of Lake Ontario, 2008.

SITE NAME	MONTH STOCKED	YEAR SPAWNED	HATCHERY	STRAIN/ EGG SOURCE	AGE (MONTHS)	MEAN WT (G)	MARKS	NUMBER STOCKED
				LAKE TROUT - SPRING YEARLINGS				
LAKE ONTARIO								
Cobourg Harbour Pier	4	2006	Harwood	Seneca Lake/Harwood	18	27.4	AdLP	37,192
Fifty Point CA	4	2006	Harwood	Seneca Lake/Harwood	18	29.8	AdLP	61,319
	4	2006	Harwood	Slate Islands/Dorion	19	28.1	AdLP	12,885
North of Main Duck Sill	4	2006	Harwood	Michipicoten Island/Dorion	19	40.9	AdLP	16,531
	5	2006	Harwood	Michipicoten Island/Dorion	19	36.6	AdLP	33,097
	5	2006	Harwood	Seneca Lake/Harwood	18	32.7	AdLP	14,044
	4	2006	White Lake	Slate Islands/Chatsworth	16	22.0	AdLP	92,365
	4	2006	Harwood	Slate Islands/Dorion	19	28.4	AdLP	17,926
Pigeon Island	4	2006	White Lake	Slate Islands/Chatsworth	16	21.0	AdLP	15,924
South of Long Point	4	2006	Harwood	Seneca Lake/Harwood	18	30.6	AdLP	40,363
	5	2006	Harwood	Seneca Lake/Harwood	18	32.0	AdLP	22,205
	4	2006	White Lake	Seneca Lake/Tarentorus	15	20.4	AdLP	64,473
	4	2006	White Lake	Slate Islands/Chatsworth	16	21.3	AdLP	15,998
TOTAL - LAKE TROUT								444,322

Appendix C. Rainbow trout stocked in the Province of Ontario waters of Lake Ontario, 2008.

SITE NAME	MONTH STOCKED	YEAR SPAWNED	HATCHERY	STRAIN/ EGG SOURCE	AGE (MONTHS)	MEAN WT (G)	MARKS	NUMBER STOCKED
RAINBOW TROUT - FALL FINGERLINGS								
DON RIVER								
East Don - Langstaff Rd	11	2008	Partnership	Ganaraska/Tarentorus	7	14.5	None	5,933
HUMBER RIVER								
Bindertwine Park	11	2008	Partnership	Ganaraska/Tarentorus	7	18.9	None	11,703
RAINBOW TROUT - SPRING YEARLINGS								
BRONTE CREEK								
2nd Side Road Bridge	5	2007	Harwood	Ganaraska/Tarentorus	15	19.5	RV	12,482
Lowville Park	5	2007	Normandale	Ganaraska/Tarentorus	12	14.3	RV	10,030
								22,512
CREDIT RIVER								
Norval	5	2007	Harwood	Ganaraska/Tarentorus	15	18.6	RV	25,300
HUMBER RIVER								
East Branch Islington	5	2007	Harwood	Ganaraska/Tarentorus	15	17.5	RV	15,519
King Vaughan Line	5	2007	Harwood	Ganaraska/Tarentorus	15	20.2	RV	16,985
								32,504
LAKE ONTARIO								
Glenora	5	2007	Harwood	Ganaraska/Tarentorus	15	18.9	RV	6,678
Jordan Harbour	4	2007	Normandale	Ganaraska/Tarentorus	11	14.3	RV	7,071
	4	2007	Normandale	Ganaraska/Tarentorus	12	21.3	RV	12,940
Millhaven Wharf	5	2007	Harwood	Ganaraska/Tarentorus	15	18.9	RV	7,788
North of Main Duck Sill	5	2007	Harwood	Ganaraska/Tarentorus	15	16.4	RV	5,473
Port Dalhousie East	4	2007	Normandale	Ganaraska/Tarentorus	11	19.5	RV	20,047
								59,997
ROUGE RIVER								
Bruce Creek	3	2007	Partnership	Ganaraska/Tarentorus	11	28.6	None	5,000
Little Rouge R. at Hwy 48	3	2007	Partnership	Ganaraska/Tarentorus	11	44.4	None	4,460
Silver Spring Farms	3	2007	Partnership	Ganaraska/Tarentorus	11	28.6	None	4,664
								14,124
TOTAL - RAINBOW TROUT FALL FINGERLINGS								17,636
TOTAL - RAINBOW TROUT SPRING YEARLINGS								154,437
TOTAL - RAINBOW TROUT*								172,073

*Does not include all partnership stocking events

Appendix C. American eel stocked in the Province of Ontario waters of Lake Ontario, 2008.

SITE NAME	MONTH STOCKED	YEAR SPAWNED	HATCHERY	STRAIN/ EGG SOURCE	AGE (MONTHS)	MEAN WT (G)	MARKS	NUMBER STOCKED
				AMERICAN EEL - ELVERS				
ST. LAWRENCE RIVER (Mallorytown Landing)								
Adelaide Island	5	2007	Private	Wild - Charlotte Co., NB, Queens Co., NS and Lunenburg/Halifax Co., NS	15	0.2	Tetracycline	186,750
Broadbill Island	5	2007	Private	Wild - Charlotte Co., NB, Queens Co., NS and Lunenburg/Halifax Co., NS	15	0.2	Tetracycline	414,900
Ferman's Point	5	2007	Private	Wild - Charlotte Co., NB, Queens Co., NS and Lunenburg/Halifax Co., NS	15	0.2	Tetracycline	437,170
Gull Island	5	2007	Private	Wild - Charlotte Co., NB, Queens Co., NS and Lunenburg/Halifax Co., NS	15	0.2	Tetracycline	37,350
Jones Creek	5	2007	Private	Wild - Charlotte Co., NB, Queens Co., NS and Lunenburg/Halifax Co., NS	15	0.1	Tetracycline	205,350
Jones Creek mouth	5	2007	Private	Wild - Charlotte Co., NB, Queens Co., NS and Lunenburg/Halifax Co., NS	15	0.2	Tetracycline	233,430
Mallorytown Boat Launch	5	2007	Private	Wild - Charlotte Co., NB, Queens Co., NS and Lunenburg/Halifax Co., NS	15	0.1	Tetracycline	26,785
Raleigh Island	5	2007	Private	Wild - Charlotte Co., NB, Queens Co., NS and Lunenburg/Halifax Co., NS	15	0.2	Tetracycline	102,710
BAY OF QUINTE, LAKE ONTARIO (Desoronto)								
Forester's Island	6	2007	Private	Wild - Charlotte Co., NB, Queens Co., NS and Lunenburg/Halifax Co., NS	16	0.1	Tetracycline	60,020
Mohawk Bay	6	2007	Private	Wild - Charlotte Co., NB, Queens Co., NS and Lunenburg/Halifax Co., NS	16	0.1	Tetracycline	165,055
Sucker Creek Bay	6	2007	Private	Wild - Charlotte Co., NB, Queens Co., NS and Lunenburg/Halifax Co., NS	16	0.1	Tetracycline	75,025
Sucker Creek Mouth	6	2007	Private	Wild - Charlotte Co., NB, Queens Co., NS and Lunenburg/Halifax Co., NS	16	0.1	Tetracycline	150,050
Telegraph Narrows	6	2007	Private	Wild - Charlotte Co., NB, Queens Co., NS and Lunenburg/Halifax Co., NS	16	0.1	Tetracycline	228,076
TOTAL - AMERICAN EEL								2,322,671

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